DYNACORD®

DIGITAL REVERB PROCESSOR **DRP 20 X**

CONTENTS

1 │ SPECIAL FEATURES

MULTI EFFECT DEVICE

The DRP 20 X generates all effects resulting from the principle of signal delay. Effects include REVERB, ECHO, CHORUS, FLAN-GER, DOUBLER, MULTITAP......

TWO-CHANNEL TECHNOLOGY

The DRP 20 X features real two-channel technology, with stereophonic inputs (L/R) and stereophonic outputs (L/R). They allow it to be used as a real stereo device (stereo in stereo), as a split two-channel device (2x mono in mono) or as a normal stereo device (mono in stereo).

32-BIT PROCESSOR - 16-BIT CONVERTER

Digital signal processing takes place in a new signal processor, developed by Dynacord and manufactured by NEC, featuring 32-bit floating-point technology with an internal dynamic response of 1680 dB. This enables the execution of even the most sophisticated internal operating processes unbelievably quickly and accurately.

The 16-bit A/D and D/A conversion corresponds to the common CD standard and produces outstanding studio sound quality.

PROGRAM VERSATILITY

The operator is provided with 100 factory presets and an additional 128 free user memories. The data of entire user banks, together with their midi settings, can be stored to compact cassette, etc. or loaded to the DRP 20 X.

MIDI CONVENIENCE

The DRP 20 X features an extremely convenient midi section providing even the advanced midi user with completely new possibilities.

E. g., external control of all parameters in real time (sequencer, keyboard...) or the simultaneous control of several parameters using a control function, or the generation of 5 different midi assignment tables and much more.

OPTION FUNCTION

This subprogram permits the selection of presets which can be freely determined by the user to suit his own individual requirements (e. g. parameter values 0-100 or in dB), as well as various tests, including white noise – and pink noise – generation, and much more.

SOFTWARE GATE

This represents a convenient means of influencing the envelope curve of a reverberation with the envelope curve of a gate. Threshold, release and gate time (up to 60s!) can be used to shape the effect to suit individual requirements.

2 | CONTROL ELEMENTS + CONNECTIONS

2.1 FRONT PANEL
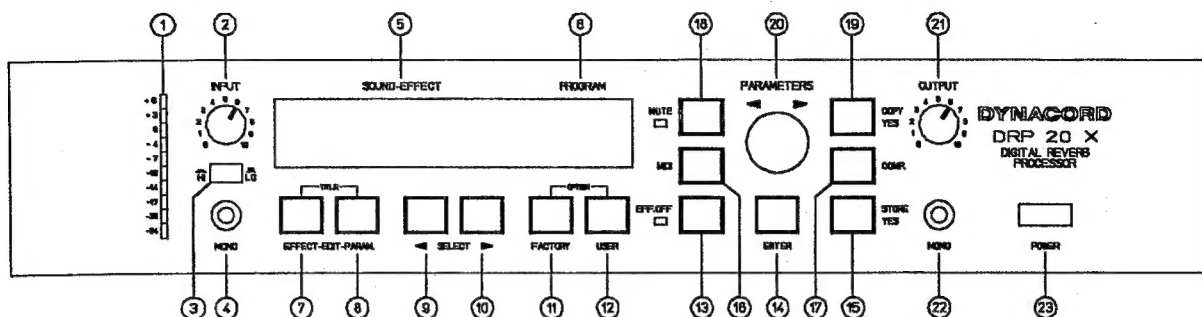
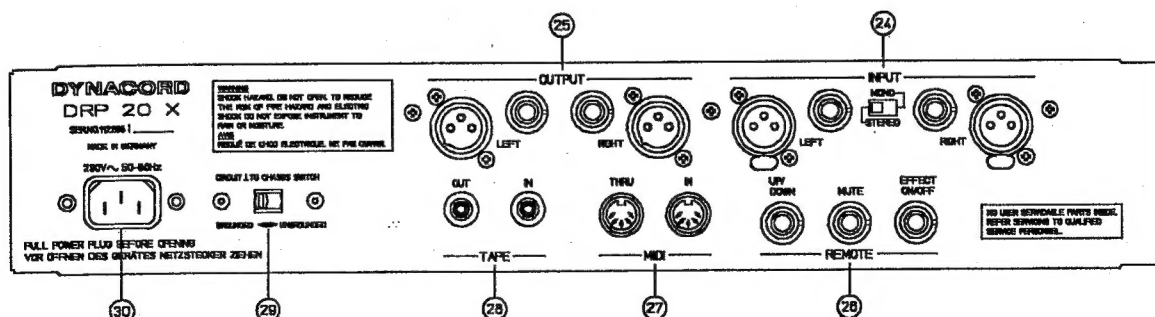| No.	Designation	Page	No.	Designation	Page
①	Input indicator	48	⑬	Effect off button	50
②	Input control	48	⑭	Enter button	49
③	HI/LO switch	48	⑮	Store/yes button	52
④	Mono input jack	47	⑯	Midi button	79
⑤	Multifunction display	47	⑰	Compare button	54
⑥	Program number display	48	⑱	Mute button	54
⑦	Effect edit button	50	⑲	Copy/yes button	71
⑧	Parameter edit button	51	⑳	Incrementer	49
⑨	Select button <	49	㉑	Output control	48
⑩	Select button >	49	㉒	Mono output jack	48
⑪	Factory program button	49	㉓	Power switch	48
⑫	User program button	49			

2.2 REAR PANEL

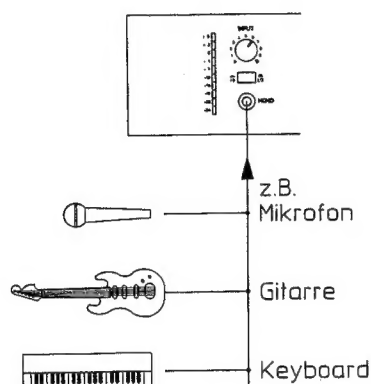| No.	Designation	Page	No.	Designation	Page
㉔	Input jacks L/R	47	㉗	Midi jacks in/thru	79
㉕	Output jacks L/R	47	㉘	Tape jacks in/out	72
㉖	Remote jacks: up/down, effect on/off Mute	75	㉙	Groundlift switch	47
			㉚	Mains jack	47

3 | SETTING UP THE DRP 20 X

The DRP 20 X must be properly connected to guarantee the best results. Before plugging the Euro mains cable into the MAINS JACK 30, make sure that the local mains voltage supply agrees with the voltage specified on the device.

(30)

3.1.1 MONO IN MONO

z.B. Mikrofon

Gitarre

Keyboard

3.1.2 MONO IN MONO

L   R

| Mixer Stereo Amp. etc. |

INPUT

| Instrumenten-Amp. Monoequipment etc. |
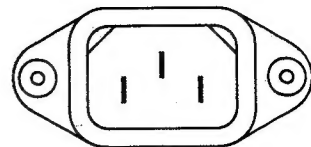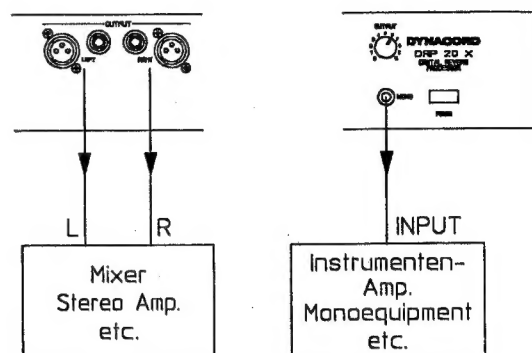
3.2 STEREO IN STEREO   (2x mono in mono)

L   R
(AUX1)   (AUX2)

| Mixer Stereo Amp. etc. |

L   R
(AUX RETURN)

| Mixer Stereo Amp. etc. |
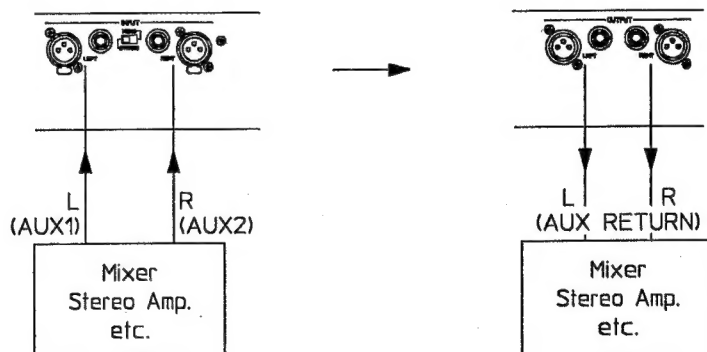
You can use the **groundlift switch** (29) to prevent ground hum.

UNGROUNDED: If you operate the DRP 20 X with other devices with other ground potential.

GROUNDED: If you operate the DRP 20 X with other devices in a 19" rack.

(29)

GROUNDED ◀ ▶ UNGROUNDED

IMPORTANT

– Always use good-quality, shielded audiocable.
– To avoid level losses, the leads should not be longer than 10 m, particularly those to the inputs.
– Do not position the device directly on or beneath a strong power amplifier, television monitor, etc., since the leakage field of transformers in such equipment could cause hum interference in the electronics of the DRP 20 X.

4 PUTTING INTO OPERATION

4.1 SWITCHING ON THE DEVICE

1, Switch on the DRP 20 X at the **POWER SWITCH** ㉓.

```
        ┌──────┐
        │      │
        └──────┘
         POWER
            │
            ▼
┌─────────────────────────┬──────┐
│       DYNACORD          │      │
│        DRP 20           │      │
└─────────────────────────┴──────┘
            │
            ▼
┌─────────────────────────┬──────┐
│    INT. CALIBRATION     │      │
│  ☒☒☒☒☒☒☒☒☒☒☒☒☒         │      │
└─────────────────────────┴──────┘
            │
            ▼
┌─────────────────────────┬──────┐
│      CATHEDRAL          │ F 01 │
└─────────────────────────┴──────┘
```
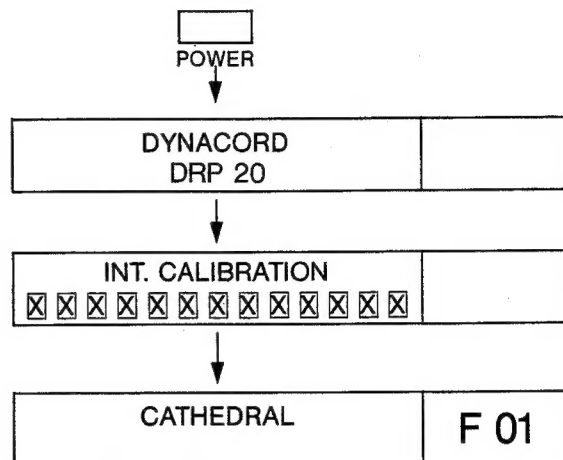
2, The display will indicate for approx. 2 second

3, The display will then indicate for approx. 15 seconds

4, The DRP 20 X is now ready for operation. The display will indicate

4.2 LEVEL ADJUSTMENT

1, First set the **HI/LO switch** ③ to **"LO"** (e. g. unlatched)

2, While using the **INPUT CONTROL** ② for level adjustment, constantly check the maximum deflection on the **INPUT INDICATOR** ①. The optimum value is 0 dB. Should the control range be insufficient, press the **HI/LO switch** ③ to the "HI" position.
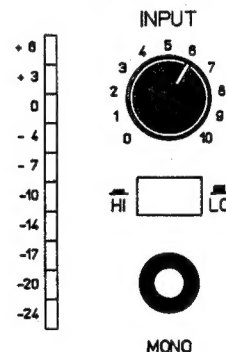
> HI: This range is selected for low levels, such as microphone, etc.
>
> LO: This range is selected for mid- range to high levels, e. g. AUX OUTPUT, audio equipment with line level, drums, etc.
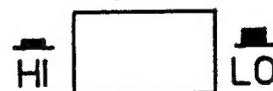
3, Use the **OUTPUT CONTROL** ㉑ to match the output level of the DRP 20 X to the following audio equipment.

5 | OPERATION

5.1 PROGRAM SELECTION

The DRP 20 X provides you with 100 fixed factory programs:

F 00 – F99

– and an additional 128 freely programmable user programs...

00 – 127.

1, To address any memory location, press -
   – **factory program button** ⑪ to select a factory program
   – the **user program button** ⑫ to select a user program

FACTORY	or	USER

2, Search for the desired program – either using the **incremen-ter** ⑳¹,.. or the two **select buttons** ⑨ and ⑩ .
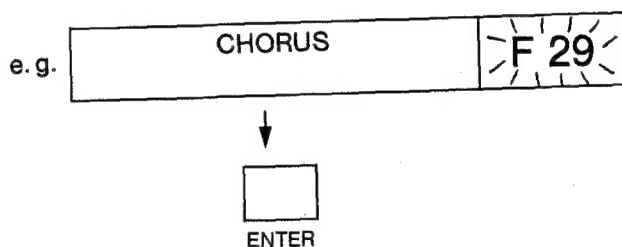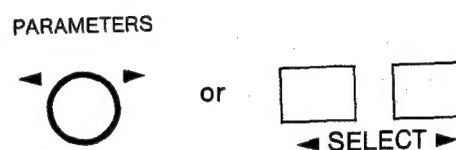
PARAMETERS

◄ ⭕ ►   or   ☐ ☐

◄ SELECT ►

3, The program title you have selected will appear on the display, the program number will flash.

e. g.

| CHORUS | ⊱F 29⊰ |

ENTER

4, Activate the program using the **enter button** ⑭ .

---
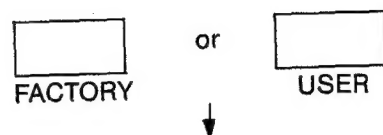
¹) The incrementer is a positive locking precision rotary knob without left or right-hand stop limit. It acts as an electronic counter which increments by one step for each latched position.

In the normal program mode it is used to select a memory location, otherwise for entering all values.

PARAMETERS
◄ ►
⚫
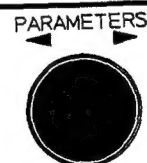
(Remotely controlled program selection is described in Section 10, page 75.)

IMPORTANT:
– Should a dot appear behind the program number as a result of inadvertently pressing a wrong button, you are not in the program mode. In this case, press the enter button ⑭ and proceed as described in 5.1.
– Hectic and forceful movement of the incrementer will not speed up the counting process but instead damage the switch mechanism.

5.2 EDITING...

The DRP 20 X has a wide variety of editing capabilities so that you can file your own completely individual effect program. You can either select the effect structure as described in 5.2.1, or alter the parameters (5.2.2).

Should you wish to process one or several parameters within an existing program without altering the effect structure, proceed directly to 5.2.2.

IMPORTANT:
- While you are editing, refer to the table on page 63. It is an extremely important editing aid and will tell you:
  1. Which and how many parameters are in each effect structure.
  2. The value range of each parameter.

5.2.1 EDITING
THE EFFECT STRUCTURE

1, Press the **effect edit button** ⑦.

2, You are now in the effect edit mode. The display will indicate, in flashing form[1], the effect structure from which the selected program has been compiled.

   If you only wish to see which effect structure is activated, without altering it, proceed directly to point 5, after point 2,.

3, You can now use the incrementer ⑳ to select one of the 26 effect structures. (These effect structures are described in Section 7 on page 57).

4, The display will indicate

5, Press the enter button ⑭ to activate the effect structure selected.

   The display will again indicate the program name and a dot[2], behind the program number.
   The effect structure selected will activate the parameter chain of the structure (see 5.2.2).

EFFECT

e.g. | EFFECT-PROGRAMM ⌐ROOM-REVERB⌐ | F 04 | *

PARAMETERS

e.g. | EFFECT-PROGRAMM ⌐ECHO + PLATE⌐ | F 04 |

ENTER

e.g. | ROOM-REVERB | F 04. |

---
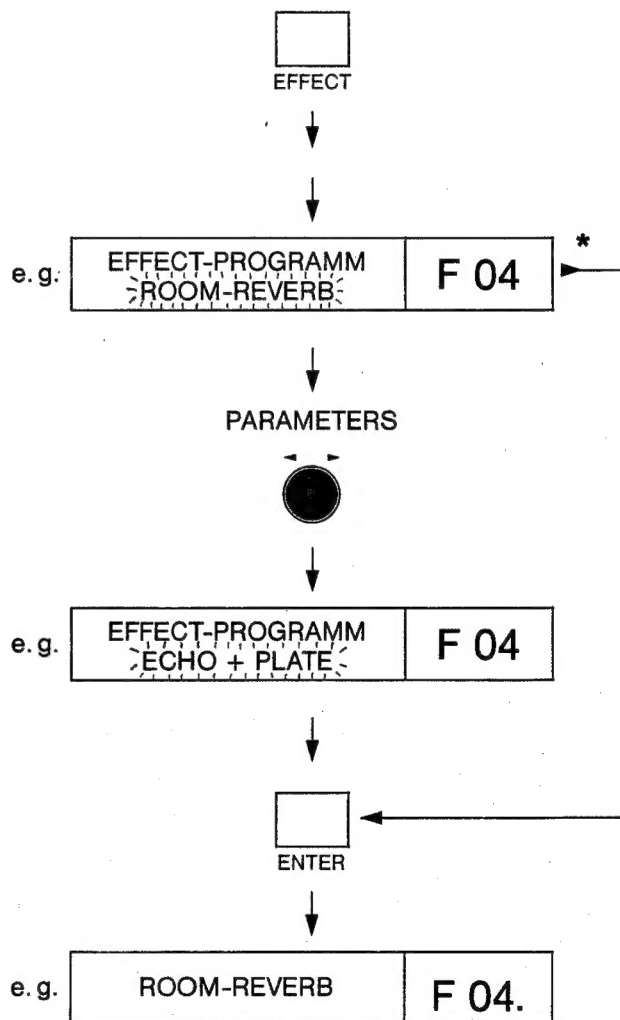
[1] Flashing information on the display always means that such is ready for editing.

[2] A dot behind the program number signalises that the program has been altered.

50

5.2.2 EDITING THE PARAMETERS

1, Press the **parameter edit button** ⑧

```
┌──┐
│  │
└──┘
PARAM.
  │
  ↓
```

2, You are now in the parameter edit mode.

e.g.
```
┌─────────────────────┬────────┐
│  ROOM - SIZE        │        │
│  ;17 000; CBM       │  F 04  │
└─────────────────────┴────────┘
            │
            ↓
       PARAMETERS
         ◄● ●►
         (  ● )
            │
            ↓
```

3, You can now use the incrementer ⑳ to alter the flashing parameter value.

4, The value selected will appear on the display. If you do not wish to alter any other parameter, proceed directly to point 7,.

e.g.
```
┌─────────────────────┬────────┐
│  ROOM - SIZE        │        │
│  ;25 000; CBM       │  F 04  │
└─────────────────────┴────────┘
```

```
            │
            ↓
    ┌──┐ ┌──┐
    │  │ │  │──►──┐
    └──┘ └──┘     │
   ◄ SELECT ►     │
      │           │
      ↓           │
                ◄● ●►
                ( ● )
```

5, Go to the next parameter by pressing the **select buttons** ⑨ and ⑩.
All parameters are described in Section 8 on page 63.

6, The display will indicate.
Point 5, and 6, can be repeated as often as required, or ...

e.g.
```
┌─────────────────────┬────────┐
│    DECAY            │        │
│  ;- 81; dB          │  F 04  │
└─────────────────────┴────────┘
        │
        ↓
```

7, ..return to the program selection mode by pressing the enter button ⑭.

```
    ┌──┐
    │  │
    └──┘
   ENTER
    │
    ↓
```

8, The display will again indicate the program name and a dot behind the program number.
You now have several possibilities of continuing:

```
┌─────────────────────┬────────┐
│  ROOM - REVERB      │ F 04.  │
└─────────────────────┴────────┘
```

- If you wish to give the program a new name, proceed to Section 5.3.
- If you wish to save the edited program to a user location under the same name, proceed directly to Section 5.4 on page 52.
- If you wish to further alter the parameters, proceed to step ① on this page.
- If you wish to return to the original program, press **enter button** ⑭ again. (This will cancel the changes made to the parameter values.)
The dot will disappear.
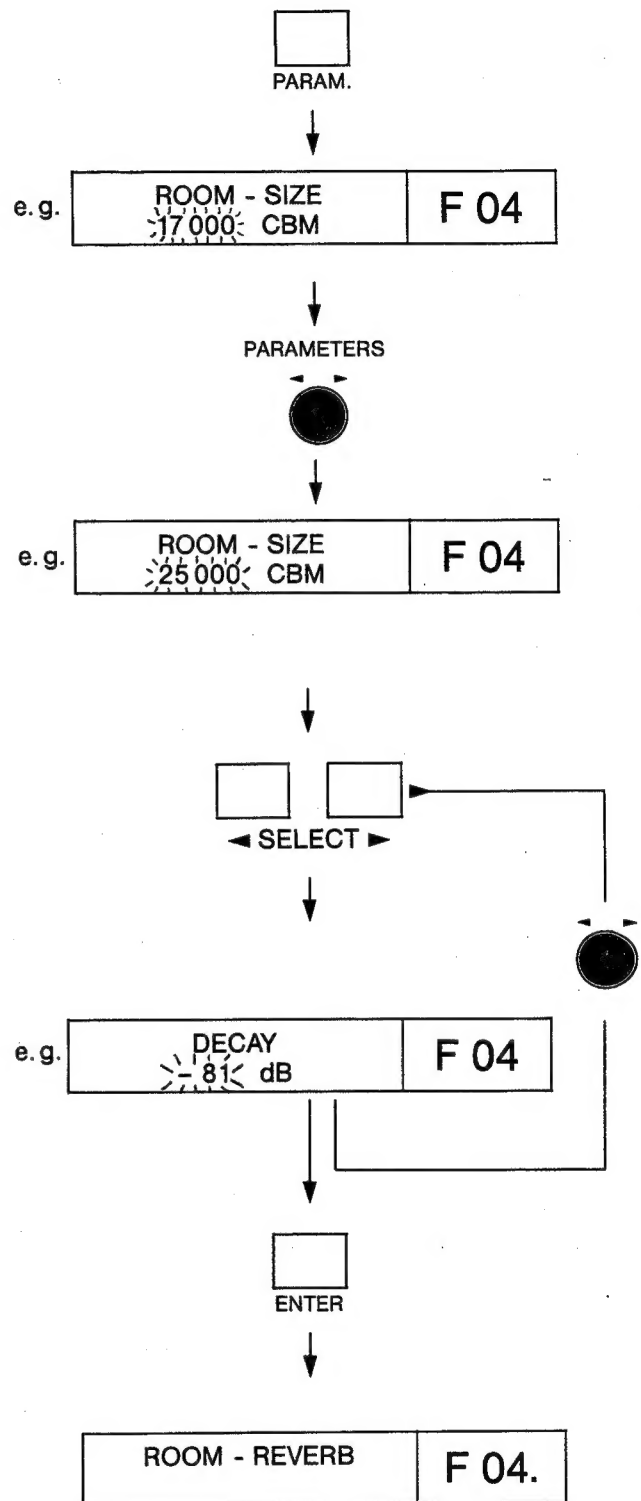
5.3 PROGRAM TITLE

The DRP 20 X provides you with the possibility of giving each user program a name of your own choice. A total of 64 characters and one line comprising 16 digits are provided for this purpose.

1, Simultaneously press the two buttons **effect edit** ⑦ and **parameter edit** ⑧.

2, You are now in title mode. The display will indicate

3, Using the incrementer ⑳ you can select the character to be placed at the flashing cursor position.

4, You can use **select buttons** ⑨ and ⑩ to move the cursor backwards and forwards.

Press user program button ⑫ to insert a space or delete a character. The new program name will only be preserved after it has been stored. The storing process is described in Section 5.4.

┌TITLE┐

EFFECT - EDIT - PARAM.

e. g. | SPACE = 'USER' KEY | F 04

◄ SELECT ►
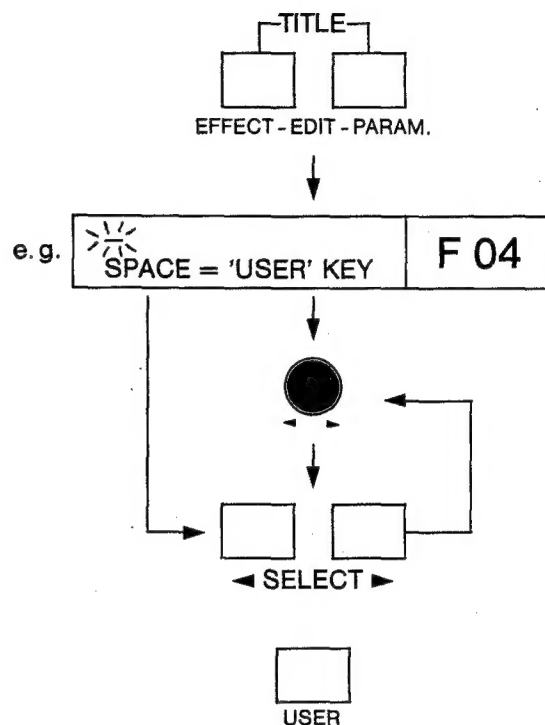
USER

5.4 STORING DATA

Whether you wish to store an edited program (parameters) or a name alteration – the storage process is always the same. This also applies to storing midi patches (Section 12.3, page 82).

All values are saved to the desired user program location.

IMPORTANT:

– It is only possible to save data to user programs. Although factory programs ("F" preceding the program number) can be changed in any way you wish, they will not be deleted.
If the storage process is started on a factory program, as in this example, the DRP will automatically suggest the same program number in the user memory.

– Changing the name of a program will not produce any parameter alteration.

1, Press the store/yes button ⑮ to start the storage process.

STORE YES

2, If you wish to save the program to the location suggested by DRP 20 X, proceed directly to step ④. The display will indicate

e. g. | STORE PRG TO ﹥04﹤ | F 04

3, Use the incrementer ⑳ to select a memory location and ...

4, ... enter this location by pressing the enter button ⑭.

ENTER

5, Since ultimate storage will delete the program previously resident at this memory location, you will be asked "ARE YOU SURE?" once again to be on the safe side.
If you wish to abort the process, press the enter button ⑭ after step ⑤.

e. g. | STORE PRG TO 04 ARE YOU SURE? | F 04

6, Press the store/yes button ⑮ to confirm. The display will indicate "Ready".

STORE YES

7, After approx. 1 second the new program, here also with new name (Section 5.3), will be stored and activated at the same time.

e. g. | ROCKET | 04

5.5 EFFECT OFF FUNCTION

Press the **effect off button** ⑬ to switch off the effect signal.

EFF - OFF

This status will be signalised by the relevant LED.

EFF - OFF

The effect off function can also be stored to a program.

(Remote control of this function is described in Section 10, page 75.)
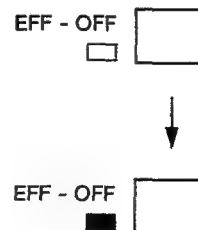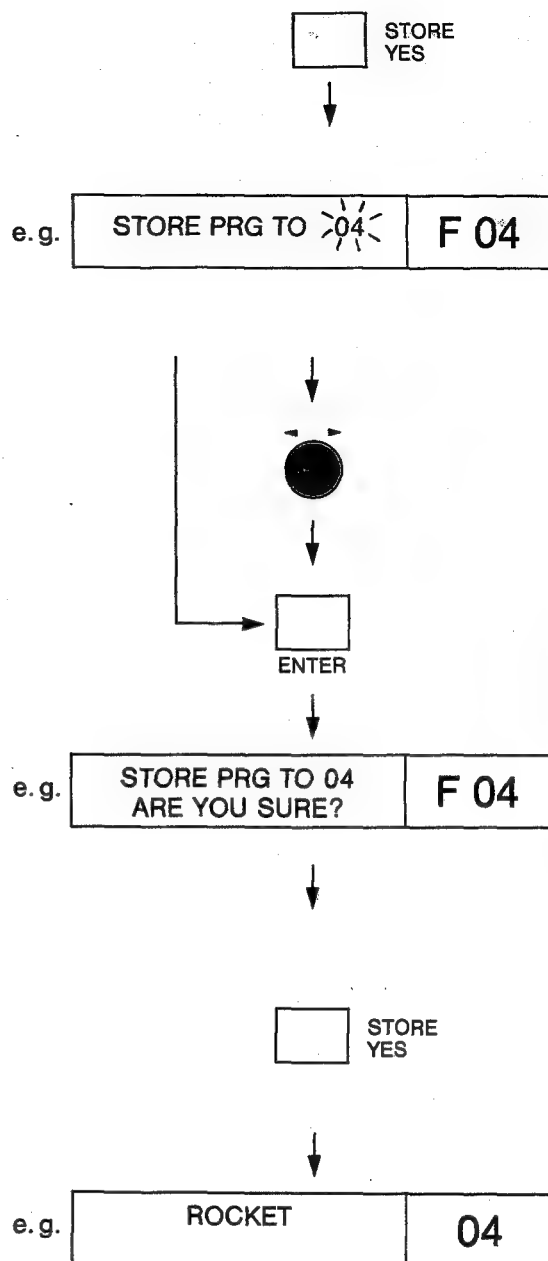
IMPORTANT:
– The original signal remains unaffected during the effect off function. However it will appear at the output only if the original parameter of this program is turned up.

5.6 MUTE FUNCTION

In contrast to the effect off function, the sound memory is deleted in the mute function.

This function is used for long reverberation programs, for freeze effect (Section 7, page 57) and for prolonged echos with several repeats.

1, Press the **mute button** ⑱ to activate the mute function.

2, This status is signalised by the relevant LED.

3, The mute function can also be stored to a program.
(The remote control of this function is described in Section 10, page 75.)

MUTE

MUTE

IMPORTANT:
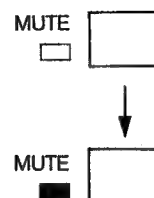- The sound memory can only process a new input signal after the mute function has been deactivated by pressing the mute button again (LED will go out), e.g. no effect will be audible as long as the mute button is activated.

5.7 COMPARE

This provides you with the possibility of filing a program you have changed to a background memory in order to compare it with other programs.

1, Press the **compare button** ⑰

2, This will now call the program previously resident in the background memory (e.g. "CHORUS") and, at the same time, store your program (e.g. "rocket") to the background memory.

3, Use the incrementer ⑳ to select any program and ...

4, ... call it up by pressing enter button ⑭ .

e.g.

| ROCKET | 04 |

COMP.

e.g.

| CHORUS | F 29 |

PARAMETERS

ENTER

5, The display will indicate

```
e.g. | CATHEDRAL 2 | F 36 |
              ↓
              [  ]  COMP.
              ↓
e.g. | ROCKET | 04 |
```
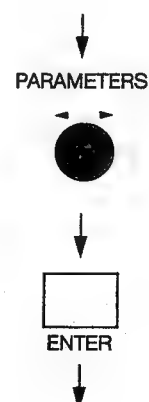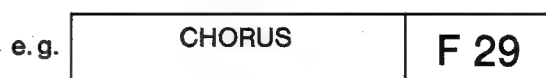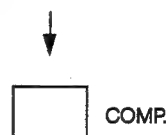
6, Now you can press the compare button ⑰ to retrieve your program ("rocket") from the background memory and compare it with the program you have just selected (cathedral). You can switch backwards and forwards between the two programs by pressing the compare button ⑰ .
Both compare programs may be altered in any way (e.g. title, parameter, structure...).
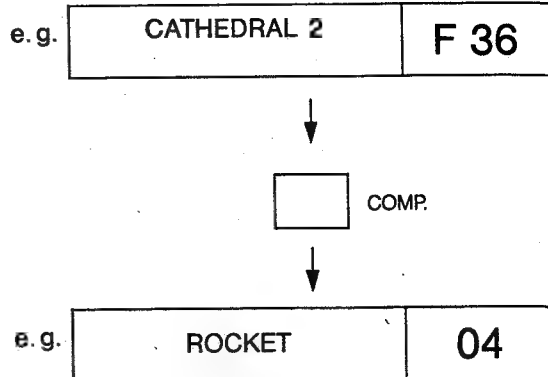
IMPORTANT:
− A program filed in the compare memory will be preserved after switching the DRP 20 X off and on!

A sound signal is emitted from speaker A. First the direct signal (double arrow) reaches the ear of listener B.

Delayed by various amounts, the initial reflections (single arrows) are perceived as **ECHOS.**

The actual **reverberation** (broken arrows) is then produced by an extremely high concentration of many different delayed reflections. The ear no longer perceives the reverberation as individual reflections. Depending on the properties of the wall, or of the reflecting object, dispersion may be of a completely irregular nature, as shown at reflection point C.

The **REVERBERATION TIME** mainly depends on the size of the room. In a large room, the reflections cover longer distances which, of course, requires more time.

The **REVERBERATION DENSITY** primarily depends on the characteristics of the room. An irregular room or a room full of nooks and crannies will produce more different reflections than, for example, a cube-shaped room.
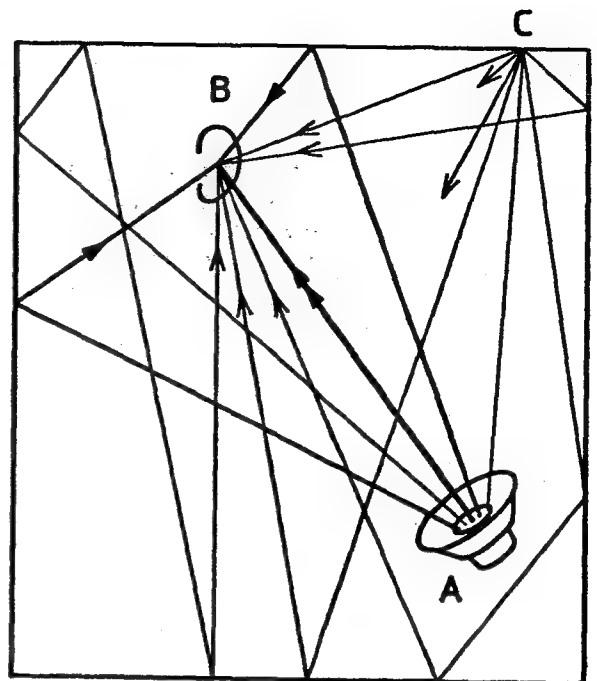
The time lapse of a reverberation:
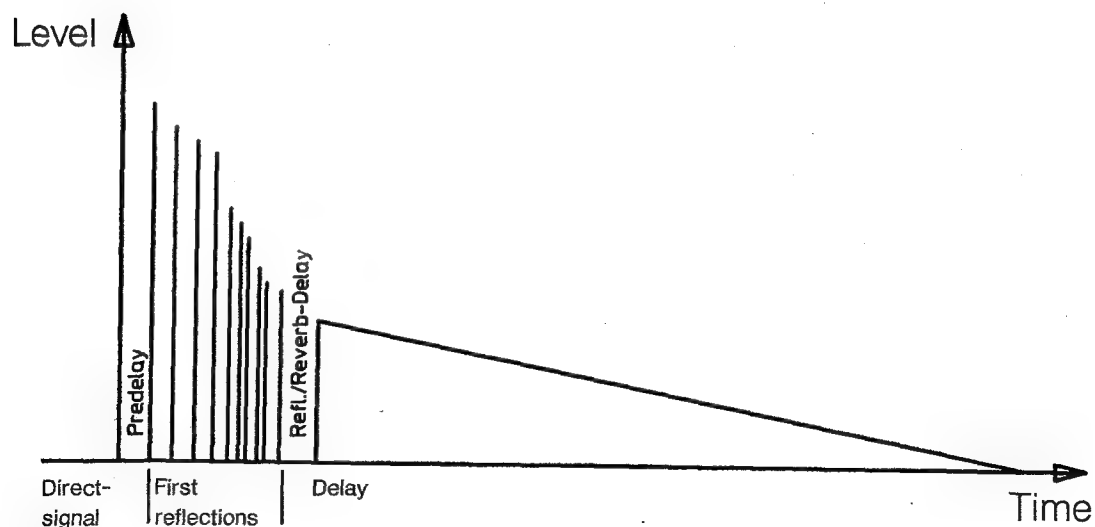
(The purpose of each parameter in the DRP 20 X is described in Section 8.2, page 64).

7 | EFFECT STRUCTURES

The DRP 20 X has a total of 26 effect structures (effect modes). They represent the basic tools to generate a program. Each effect structure has its own range of parameters, which are optimally geared in type and number to the respective effect.

(The individual parameters are described in Section 8, page 63. The effect/parameter table in Section 8 on page 63 shows you which parameters are featured in the various effect structure).

All 26 effect structures are listed and explained in detail in this Section.

A Original Through	N L = VCO / R = Room
B Two Channel Echo	O L = Echo / R = Live
C VCO-Echo Stereo	P Freeze Automatic
D Plate Reverb	Q Freeze Manual
E Room Reverb	R Plate Reverb & Gate
F Echo + Plate	S Room Reverb & Gate
G Echo + Room	T Gated Reverb
H VCO-Echo + Plate	U Echo + Gated Reverb
I VCO-Echo + Room	V Multitap 2 x 3
J Echo + Live Reverb	W Multitap 2 x 6 Syn
K L = Echo / R = Plate	X Multitap Presets
L L = Echo / R = Room	Y Stereo Flanger
M L = VCO / R = Plate	Z Stereo Chorus

A   ORIGINAL THROUGH (e. g. F00)

This effect structure merely has the purpose of looping through an input signal directly to the output. The output volume can be stored to memory. A program of this type is used, for example, to control panorama by means of MIDI commands (see MIDI......)

B   TWO CHANNEL ECHO (e. g. F23)

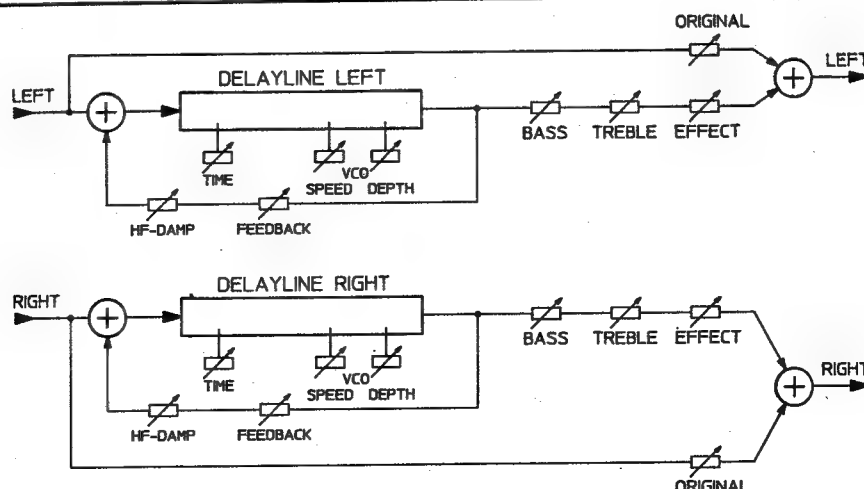Here, the DRP 20 X operates as a real stereo echo device. The two channels, L and R, can be edited completely independently of each other.

> **IMPORTANT:**
> - The appropriate examples relating to individual effect structures are given in parentheses.

## C   VCO – ECHO STEREO (e. g. F24)

has the same structure as B and additionally features a modulation unit for each channel.

D   PLATE REVERB (e. g. F03)
E   ROOM REVERB (e. g. F04)

These two structures constitute the heart of the DRP 20 X and are used to create all stereophonic room simulations. Both reverberation types have the same number of parameters. The difference lies in the transient response of the reverberation.
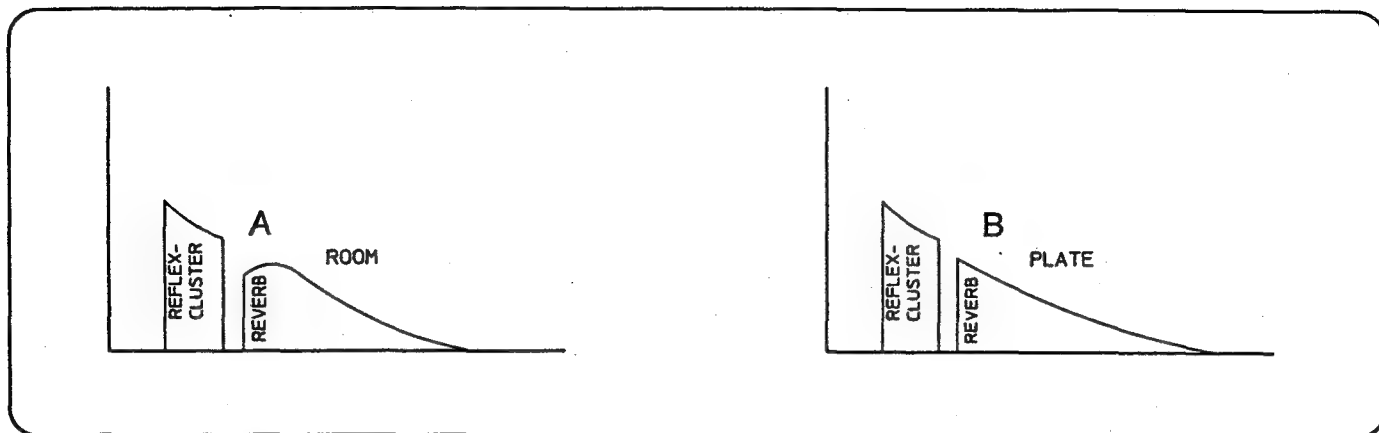
Whereas natural rooms build up slowly (A), rapid transient response (B) is typical for plate reverberator.

The DRP 20 X simulates an exceptional variety of different reverberation types. The wealth of editing possibilities is illustrated in the following box using one example.

PRE-DELAY	1.Reflection Cluster (Stereo)			Rev.-Delay	„Transient response" build-up	Room geo-metry	Room "Size"	DECAY	DAMPING		Gate	+	Rev.	Gated Rev. + = reverse		Freeze
msec	TYPE	SIZE	VOL	msec	CHARACT.	Proportion	cbm	dB	Hi	Lo	Thres.	Time	release	Time	Decay	Trigger
0		Small	0	0			0,01	0	0	0	0	1ms	0	1ms	99	
	ROOM	Medium				Cathedral										
		Large														
		Small			ROOM											Auto
	HALL	Medium				Cave										
		Large														
		Small					10000	-30	0,5	1	50%	350ms	-90	250ms	0	
	PLATE	Medium				Tube										
		Large			PLATE											MIDI
		Small														
	SPRING	Medium				Cube										
		Large														
		Small														
	REVERSE	Medium				Shattering										
		Large	max				99383	∞	1	2	100%	60sec	∞	500	∞	

For instance, a large concert hall can be easily given the reflection characteristics of a small room, or a small room the reflection characteristics of a large concert hall. This somewhat unusual setup can, however, easily arise in every day life, which becomes clear from the following example:

e. g.:   A production workshop is often equipped with large machines or metal cabinets which stand close to each other and thus exhibit the same reflection characteristics as in a small room. On the other hand, a bare, empty room which has just been wallpapered for instance, produces reflections similar to those encountered in large halls.

F   ECHO + PLATE (e. g. F14)
G   ECHO + ROOM (e. g. F13)

exhibit the same structures as D and E and additionally feature a preliminary mono echo which can be altered in terms of delay time, feedback and echo volume. The "+" between the two effects symbolises the series arrangement.

H   VCO-ECHO + PLATE (e. g. F16)
I   VCO-ECHO + ROOM (e. g. F15)

function in exactly the same way as F and G, with the addition of a modulation unit in the upstream echo. Modulation can be determined in **speed** and **depth**.

J   ECHO + LIVE REVERB (e. g. F08)

Here, a mono echo of the special stereo reverb form "live reverb" is switched in upstream. Live reverb is used to simulate the reverb effect of the legendary Dynacord VRS 23 from two delay units.

K	L = ECHO	/	R = PLATE (e. g. F19)
L	L = ECHO	/	R = ROOM (e. g. F18)
M	L = VCO	/	R = PLATE (e. g. F21)
N	L = VCO	/	R = ROOM (e. g. F20)
O	L = ECHO	/	R = LIVE (e. g. F22)

These five effect structures are designed for two-channel operation, e. g. left and right channel work as two separate mono effect devices. This can be seen by the oblique stroke (/) in the middle of the designation. It symbolizes the separation and thus the parallel operating capability of the two effects.

As seen from their names, the individual structures have been adopted from the above-mentioned structures B to J, here of course in mono and combined form.

The DRP 20 X must in this case be wired as described in Section 3.2 for correct operation.

Two channels echo / reverb
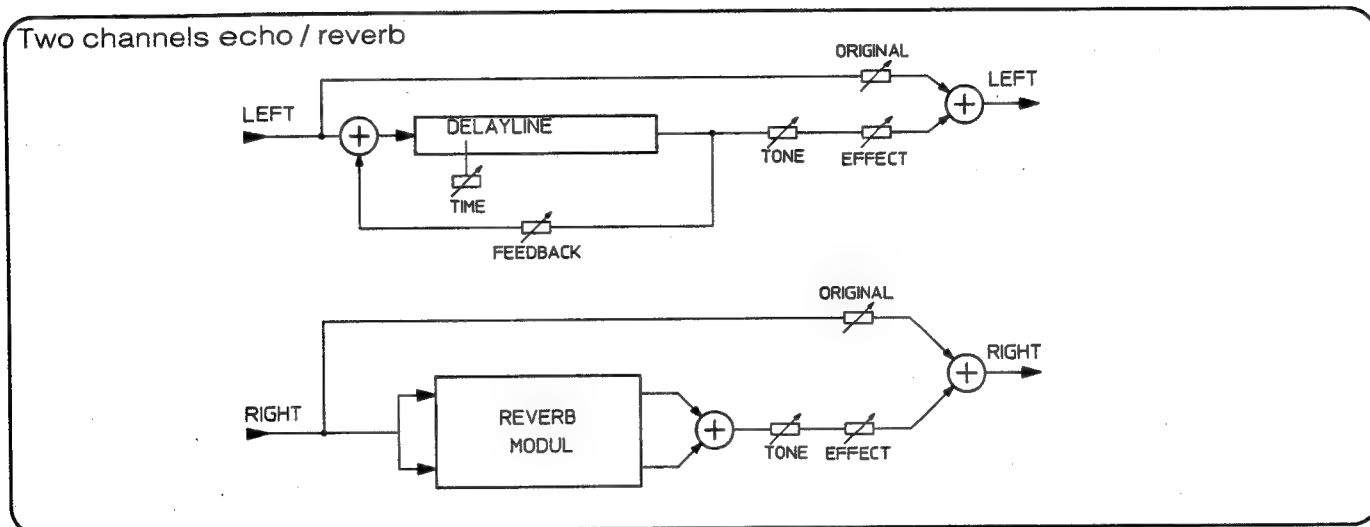
IMPORTANT:

- In the effect structure designations:
  "+" = series mode (stereo)
  "/" = parallel mode (2x mono)

P   FREEZE AUTOMATIC (e. g. F33)

This structure has the purpose of "freezing" a reverberation. The current reverberation pattern is continually recalculated in the memory. This produces an infinite nebulous reverberation.

In the freeze automatic mode, the freeze effect is automatically activated when a specific input level is exceeded. Here activation and deactivation of the input signal can be defined using the parameters **threshold on** and **threshold off**.
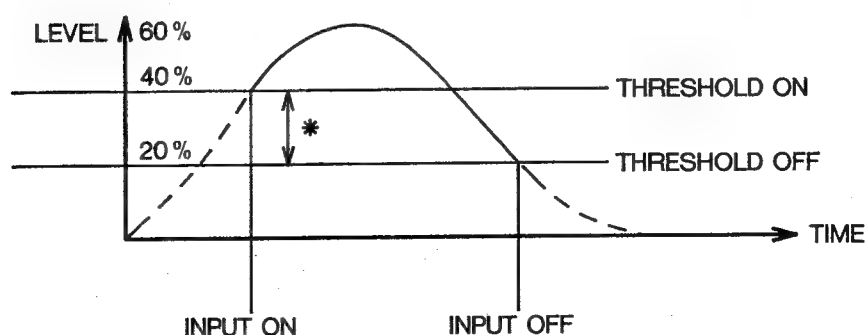
The figure below shows a simple example:

The freeze memory is opened once 40 % of the input level (0 dB = 100 %) is reached. If the level falls below 20 %, the memory is closed again. Only this signal information is included in the reverberation loop. Softer signals, such as noise or crackle, are thus eliminated from the very start – the reverberation signal remains crisp.

FREEZE (AUTOM.) FRZ. OFF * INP. OFF	F 33
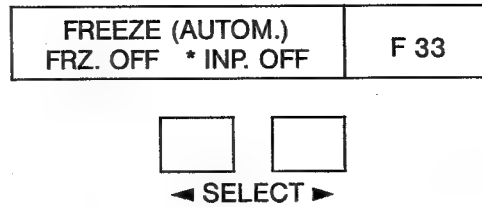
◄ SELECT ►

After calling the program, the freeze function is activated by pressing the left-hand select button ⑨. Automatic opening and closing of the gate is indicated on the display (*) in the form of INP. ON and INP. OFF.

When the freeze function is switched off, the signal will fade in accordance with the preselected decay. The **mute button** ⑱ can be used to delete the freeze memory and thus abort the **effect** (see mute function, Section 5.6, page 54).

Effect off ⑬ will retain the freeze signal which will be merely muted.

Q   FREEZE MANUAL (e. g. F12)

functions in exactly the same way as P, only here the input is controlled manually. This is performed using the right-hand **select button** ⑩ and is indicated on the display. (INP. ON/INP. OFF).

R   PLATE REVERB & GATE (e. g. F12)
S   ROOM REVERB & GATE (e. g. F11)

The effect structures correspond to those of D and E (plate reverb and room reverb). The envelope curve (shape) of the reverberation can be altered to suit individual requirements by means of the envelope curve of a freely programmable gate. You are provided with three additional parameters for this purpose: The **threshold level**, e. g. the threshold level at which the gate opens, the **gate time** up to 60 seconds (!) and the **release time**, which can be used to close the gate at speeds ranging from slow to fast.
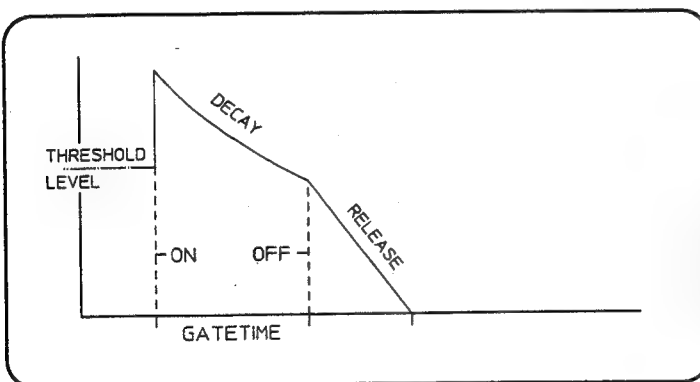
IMPORTANT:

A long gate time also requires a decay setting (e. g. 0 dB) which automatically adapts the reverberation time accordingly. Otherwise the reverberation will decay as of the gate – OFF point.

T   GATED REVERB (e. g. F09)

This effect structure permits the popular forward and reverse gated hall effects. The length of this effect can be determined by means of a **gate time** up to 500 ms. During this period, the input signal is processed into an extremely dense reverberation effect. The parameter ± decay can be used to select forward and reverse reverberation as well as the switch-off acoustics (click...soft). Otherwise, the reverberation parameters (except ROOM SIZE proportion) remain the same as for D and E.

U   ECHO + GATE REVERB (e. g. F17)

has the same structure as T and additionally features an upstream mono echo.

V   MULTITAP 2x3 (e. g. F30)
W   MULTITAP 2x6 SYN (e. g. F31)
X   MULTITAP PRESETS (e. g. F32)

The multitap effects are comparable with band echo devices with several sound heads.

MULTITAP (2 x 3 TAPS)

MULTITAP PRESETS (2 x 11 TAPS)
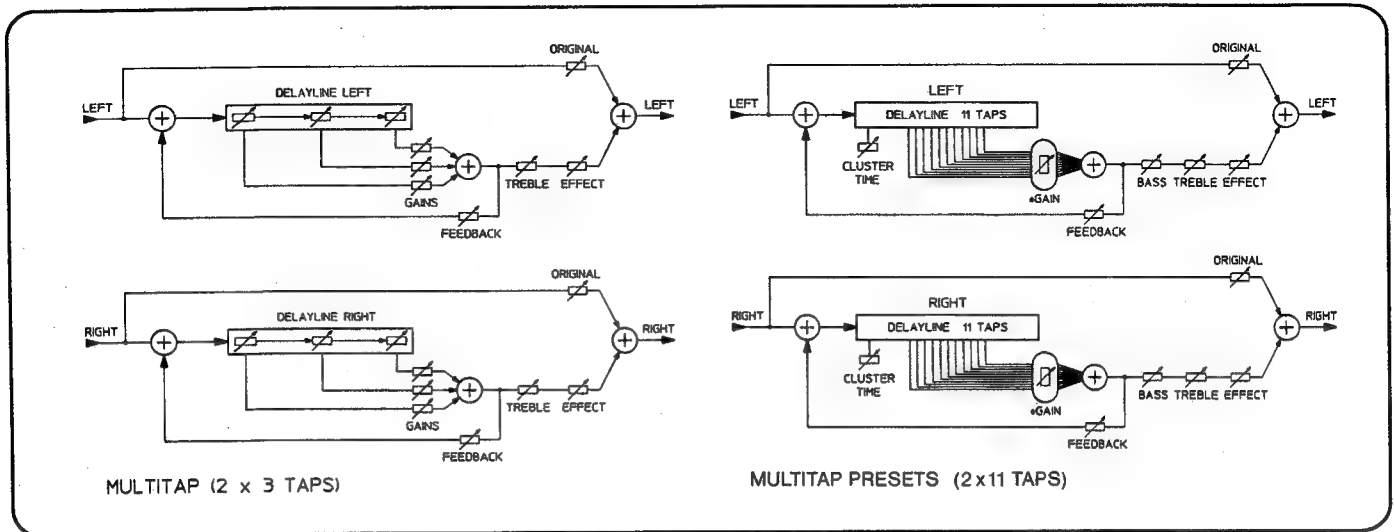
Six delay units are provided in V (2x3), 3 left and 3 right. All 6 units can be assigned different delay times and volumes.

W has 2x6 units, however left and right-hand channels are synchronized.

X has 11 delays per channel. These are grouped together to form a stereo cluster to facilitate operation. This cluster can be drawn out using **cluster time** and shifted into various stereo room simulations by means of **balance**. It is possible to select 9 different clusters for L and for R. The left and right channels also have separate **feedback** settings for all three multitap effects.

Y   STEREO FLANGER (e. g. F25)
Z   STEREO CHORUS (e. g. F27)

In these two effect structures, several delays operate with asynchronous modulators to generate all chorus, doubling, phasing and flanging effects.

Chorus has 4 delays which can be combined using the parameter **"delay ratio"**. Whole new realms of stereophonic effects can be generated with the other, comprehensive setting capabilities provided.

STEREO - FLANGER
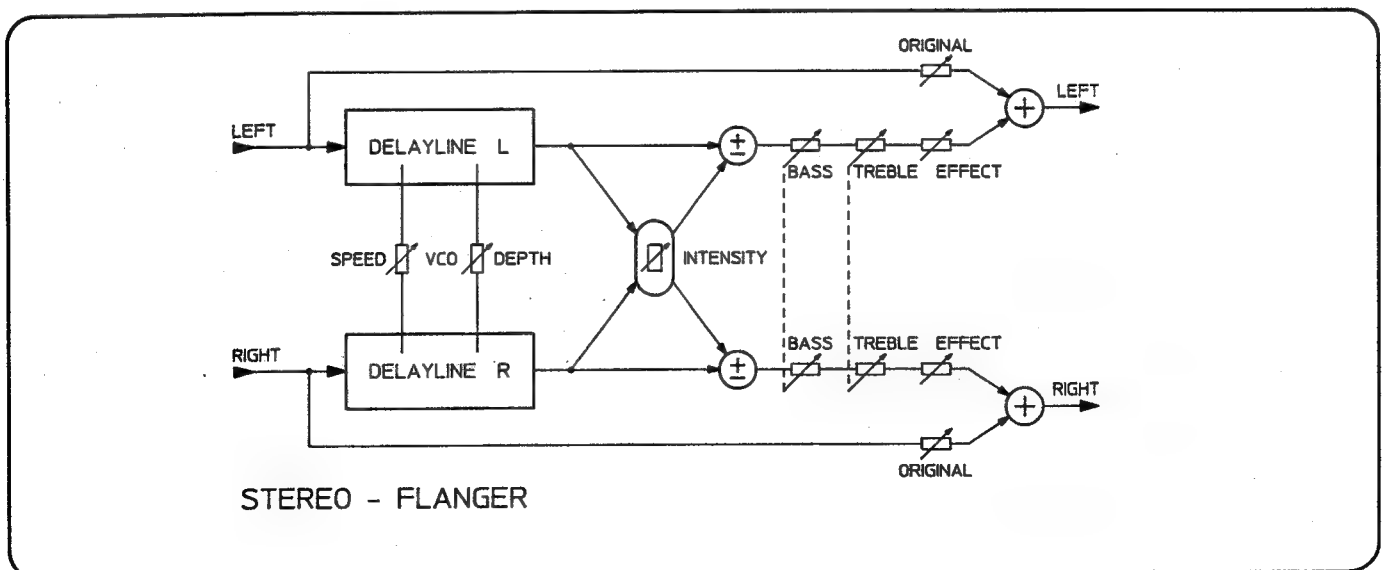
8 | PARAMETERS

Each of the effect structures described in Section 7 has a specific number of parameters. These are logically allocated and defined in software. The table in 8.1 indicates the parameters present in the various effect structures. A detailed description of the parameters and their importance is contained in Section 8.2, page 64.

8.1 EFFECT/PARAMETER TABLE

Parameter \ Effectstructures	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Original L/R	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Effect L/R		●	●	●	●	●	●	●	●	●						●	●	●	●	●	●	●	●	●	●	●
Tone L/R				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					
Bass u. Treble L/R		●	●																			●	●	●	●	●
Delay Ratio										●					●											●
Reverb Delay Time										●					●											
Proportion				●	●	●	●	●	●		●	●	●	●		●	●	●	●							
Room Size				●	●	●	●				●	●	●	●		●	●	●	●							
Decay				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					
Release (Gate)																		●	●							
Lo Damp				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					
Hi Damp				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					
Gate Time																		●	●	●	●					
Reflexion Volume				●	●	●	●	●	●	●	●	●	●	●				●	●	●	●					
Reflexion Cluster				●	●	●	●	●	●	●	●	●	●	●				●	●	●	●					
Predelay				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					
Refl./Reverb - Delay				●	●	●	●	●	●	●	●	●	●	●				●	●	●	●					
Echo Return					●	●	●	●		●	●	●	●	●							●	●	●			
Echo Delay Time						●	●	●	●	●	●	●	●	●							●	●	●			
Feedback L/R		●	●			●	●	●	●	●	●	●	●	●							●	●	●	●	●	●
Cluster Type																								●		
Cluster Time																								●		
Decay Balance																								●		
Threshold (On/Off)															●			●	●							
VCO Depth			●					●	●				●	●												
VCO Speed			●					●	●				●	●												
Intensity																									●	●
Modulation Depth																									●	●
Modulation Speed																									●	●
Delay Time L/R		●	●																							●
HF-Damp L/R		●	●																							
Reverb Return										●	●	●	●	●	●											

(x6 indicated at columns V–W for the Predelay / Echo Return / Echo Delay Time rows)

8.2 DESCRIPTION OF PARAMETERS

Different manufacturers often give different names to the same functions. This Section is designed to provide you with information to avoid confusion and explain the tasks and setting ranges of the various parameters.

Should you be less familiar with effect devices and the structure of reverberation, carefully read this Section as well as Section 6 (What causes reverberation?) before editing a program.

PROPORTION

determines the geometry of a room. Selection from a total of 5 proportions is possible:

1, CATHEDRAL — a parallelepiped room with extremely good acoustic qualities (e. g. church, cathedral)
2, CAVE — a shallow, relatively low room (e. g. underground car park, cellar ...)
3, TUBE — a long room, practically circular in cross section (e. g. subway, tunnel, bunker, wine cellar...)
4, CUBE — an equal-sided, cube-shaped room (e. g. small but high room, high warehouse...)
5, SHATTERING — an effect which can be produced in any bare, smooth-walled room, particularly when the listener is standing in
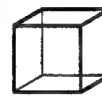the centre. The result is an initial shattering reverberation which is condensed during the decay.
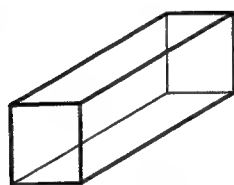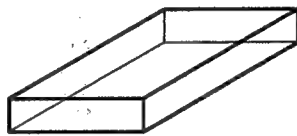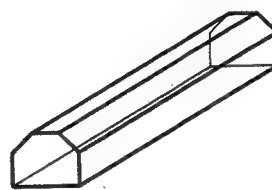
CATHEDRAL   CAVE   TUBE   CUBE

ROOM SIZE

This is for specifying the room size in cubic meters.

| ROOM – SIZE 0,01 CBM – 99 383 CBM | F 01 |

The value 99,000 cbm would, for example, correspond to a large cathedral with a length of 75 m, width of 30 m and height of 45 m.

DECAY

Reverberation time is the period required by the reverberation to fade away to one thousandth (-60 dB) of its original level.

Decay can be used to select the reverberation time. Decay is a feedback factor similar to echo feedback. In the case of gated reverb (T) and echo + gated reverb (U), the decay is also adjustable in the ± range. This will boost the reverberation.

| DECAY –99 dB – 00 dB | F 01 |

-99 dB is the shortest reverberation time, 00 dB representing infinity. Therefore, the DRP 20 X generates all reverberation times. The damping information in "dB" (decibel) is a relative value. It would be technically incorrect to specify a fixed time in seconds since, for example, a change in the room size also changes the reverberation time.

IMPORTANT:

– All parameters in dB can also be optionally indicated as a relative numerical value (0-100). For the necessary alterations, please refer to OPTION, Section 11, page 76.

LO DAMP ——— HI DAMP

These two parameters are extremely important for the characteristics of various rooms. They determine the frequency response of the reverberation.

LO DAMP determines the damping of basses in relation to reverberation time.

HI DAMP determines the damping of trebles in relation to reverberation time.

| LO DAMP HI	F 01
x 0.00–2.00 x 0,00–1,00	

Multiplying the reverberation time by the selected damp value produces the reverberation time for the basses (LO) or for the trebles (HI)

e. g. HI DAMP = x 0.50 : 8 s x 0.50 = 4 s

In this case, the trebles would have decayed in half the normal reverberation time.

In practice, this would be, for example, a vault with rough walls – the trebles decay quickly whereas the basses fade away over a longer period. The situation would be different, for example, in an empty, tiled room – trebles and basses decay uniformly (LO = x 1.00, HI = 1.00).

Other spacial conditions are encountered in practice in which the basses are highly emphasized or boosted (e. g. bass booming in subways). A simulation of this type is handled by the LO DAMP range above x 1.00.
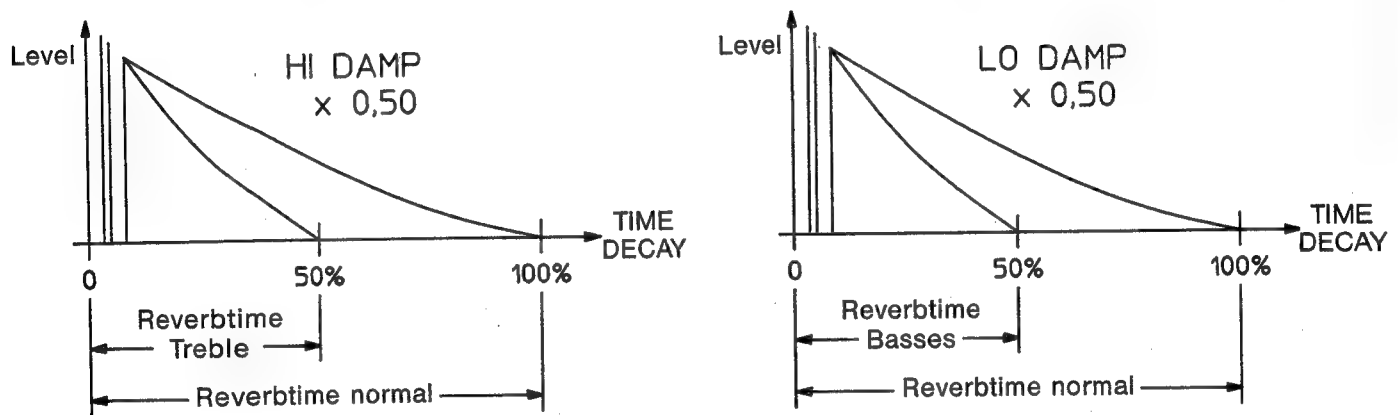
REFLEXION CLUSTER

This parameter is used to define the type of the initial reflections. 5 different clusters can be selected:

ROOM	HALL	PLATE	SPRING	REVERSE
small medium large	small medium large	small medium large	small medium large	small medium large
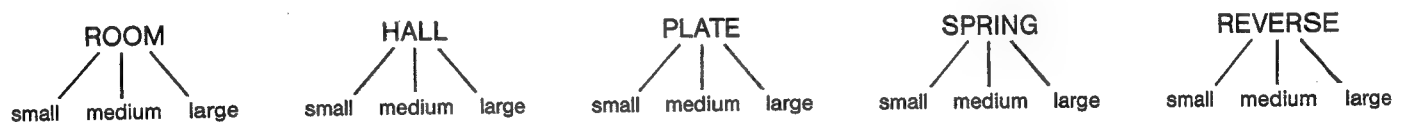
The density of each cluster can be selected in the form "small", "medium" and "large", producing a total of 15 different reflection types.

65
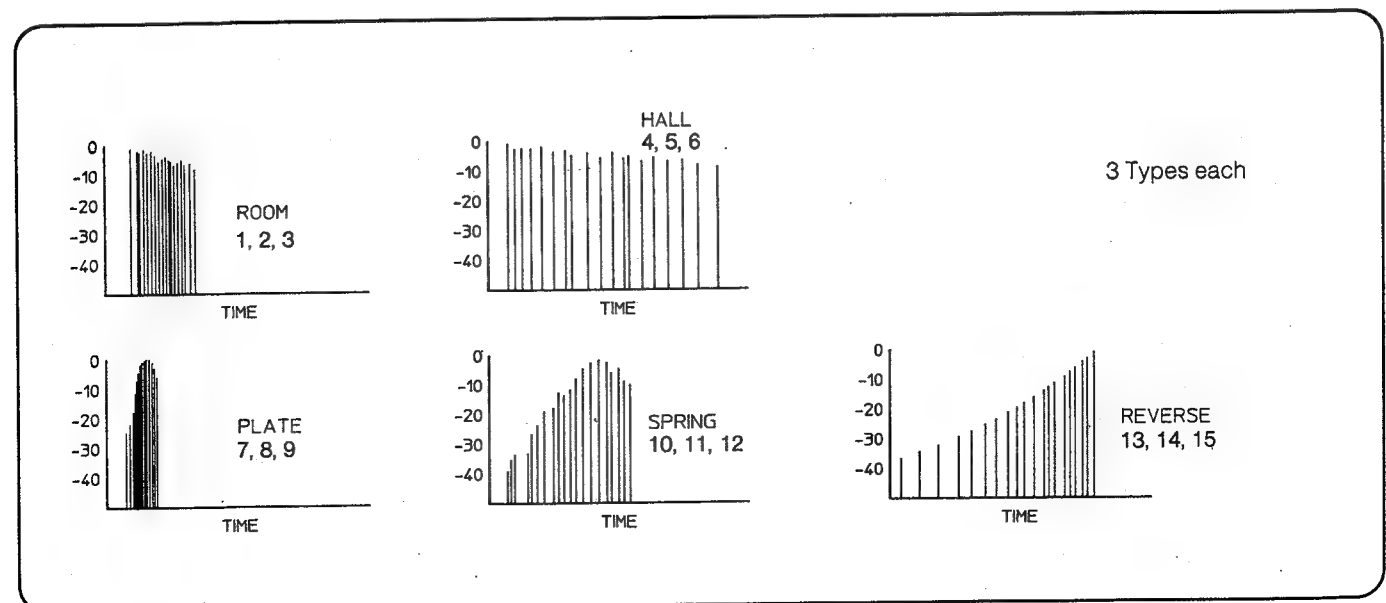
Together with the parameters PREDELAY (page 66) and REFL.-REVERB DELAY (page 66), the REFLECTION CLUSTER parameter is the most important parameter in generating a natural and authentic reverberation program.

These three parameters determine the depth and the width of a room and, not least, the locations of sound source and listeners in the room.

> **IMPORTANT:**
>
> An extension of the cluster time may result in a change of the parameters "PREDELAY", "REFLECTION /REVERB DELAY" (max. possible value is set).
> Sum of these delays = 300 ms
> Priority:
> 1 Reflection cluster
> 2 Predelay
> 3 Reflection/reverb delay

REFLECTION VOLUME

This defines the dominance, e.g. the volume of the reflection cluster. It can be lowered or raised.

REFLEXION VOLUME – 79 dB – + 20 dB	F 01

In practice, this parameter produces "soft" rooms (-dB) and "hard" rooms (+dB).

PREDELAY ——— REFLEX/REVERB DELAY

The predelay parameter is the time between the original signal and onset of the actual reverberation. Reflex/reverb delay is used to determine an additional delay between the cluster of the initial reflections and the reverberation. This parameter can also be moved into the negative range. In this case, the reverberation is moved into the reflex cluster.

The total predelay time (= predelay + reflex cluster + reflex/reverb delay) ranges up to **300 ms**, which is more than sufficient to simulate very large rooms.
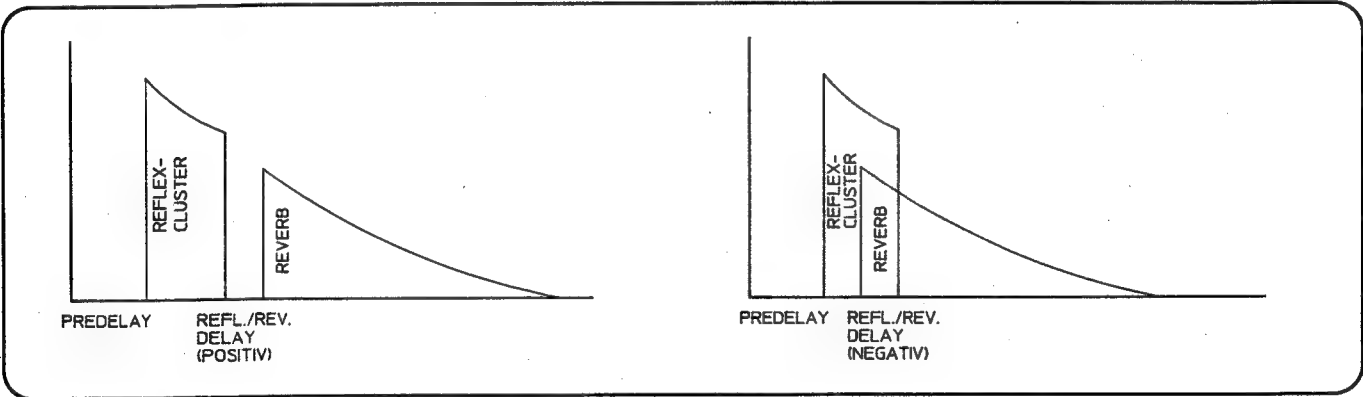
In practice, these two parameters determine the size of a room and the distance of the sound source.

REVERB DELAYTIME (J, O)*

This parameter is only contained in the two effect structures with live reverb. Since the live reverb is generated from delays, reverb delaytime specifies the time (in ms) in which these delays ensue.

REVERB – DELAYTIME 00 ms – 400 ms	F 08

* Effect structures given in parentheses mean that the parameter is only present in these effect structures.

DELAY RATIO (J, O, Z)

This determines the stereophonic distribution of the delays in the form of a ratio. Delay ratio can, in simpler terms, be regarded a divider ratio of the delay time selected.

| DELAY RATIO
x 0,00 – x 1,00 | F 08 |

DELAY TIME

This parameter determines the delay time between original sound and delay (echo). The DRP 20 X has a maximum delay time of 1700 ms. However, the delay time is dependent on the effect structure. In the case of combination programs (e.g. ECHO + PLATE, F), the maximum selectable delay time also depends on the room size selected.

e.g.

| L   DELAY-TIME   R
300 ms   1400 ms | F 23 |

In the stereo echo programs (B, C), left and right are added together. (L + R = max. 1700 ms)

| DELAY-TIME
00 ms – 900 ms | F 27 |

In the stereo chorus (Z), the delay time ranges up to 900 ms.

| * ECHO DELAYTIME
00 ms – ca. 1500 ms | F 13 |

In the combination programs (F-O), the delay time ranges up to approx. 1500 ms, depending on other parameters.

e.g.

| DELAY 3 L   GAIN
00 ms – 900 ms + 95% | F 30 |

In the multitap programs (V, W), each individual delay can be up to 900 ms.

FEEDBACK

This parameter specifies the number of echo repeats (feedback). Movement into the negative range will cause a 180° phase displacement.

| L   FEEDBACK   R
–900 – + 99% I – 99% – + 99% | F 23 |

In the structures B, C, V and X, both channels are separately programmable.

| * ECHO FEEDBACK
– 99% – + 99% | F 13 |

In all other programs with echo, feedback can be controlled for both channels together (F-O, U, W, Y, Z).

* In the case of the combination programs, the word "echo" in front of the parameter helps to avoid confusing the large number of parameters.

THRESHOLD (P, R, S)

The effect structures P, R, S feature a programmable gate. Threshold defines the level at which the gate is opened or closed.

| ON   THRESHOLD   OFF
00% – 100% I – 00% – + 100% | F 33 |

In the case of freeze automatic (P), the two parameters **threshold on** and **threshold off** determine when the input is switched on and off (see Section 7, page 57, below).

| THRESHOLD
00% – 100% | F 12 |

In the case of the structures R and S **threshold** determines the point at which the reverberation processor is switched on. The gate is further influenced here by the parameters gate time and release (see below).

GATE TIME (R, S, T, U)

This parameter specifies the opening time of the gate in ms, or in s.

GATE-TIME 01 ms – 60,0 sec	F 12

In the case of structures **R** and **S**, the gate can be opened for up to 60s (!).

GATE-TIME 01 ms – 500 ms	F 09

In the case of structures **T** and **U**, the gate time can be defined between 01 ms and 500 ms.

RELEASE (R, S)

This is also a parameter which only appears in conjunction with the gate, e. g. only in the two effect structures R and S. Release determines the switch-off characteristic or the decay of the gate in accordance with the gate time selected.

DECAY RELEASE –99 dB – 00 dB	F 12

The value -99 dB would, for example, cause the gate to close harshly and quickly whereas higher values produce a longer fade (= gate closes gently).

Specifically in the case of structures R and S, the three parameters THRESHOLD, GATE TIME and RELEASE provide a convenient means of superimposing your envelope curve (mask) over the reverberation selected (see Section 7, page 57, below).

ECHO RETURN —— GAIN

Specifically in the case of the combination structures (F-I, K-O), echo return has the purpose of defining the volume of the echo in relation to the second effect.

ECHO RETURN –79 dB – + 20 dB	F 14

In the multitap programs **(V, W)** it is possible to control the volume of each individual echo. The parameter here is called **GAIN** and is specified in %.

e. g.

DELAY 2 L GAIN 300 ms – 100% – + 100%	F 30

Moving the gain into the negative range will produce a 180° phase displacement of the echo.

REVERB RETURN (K-O)

This parameter occurs in the split structures and controls the volume of the reverberation effect.

REVERB RETURN R –79 dB – + 20 dB	F 19

The letter "R" on the display specifies the reverberation effect channel (here "right").

HF-DAMP (B, C)

In a similar way to HI-DAMP in the reverberation programs, this parameter determines the frequency response of the trebles in the two stereo echo programs. It also determines the ratio in which the trebles are damped during the course of repeats. Settings are made separately for each channel (L/R).

L HF-DAMP R x 0,00 – x 1,00 I x 0,00 – x 1,00	F 23

Example: If a feedback of 50 % meant 10 repeats, the trebles would be damped to half their original level after 5 repeats for an HF-DAMP setting of 0.50.

TONE —— BASS —— TREBLE

These parameters can provide the effect signal with its own tone setting. The effect structure determines whether bass and treble can be controlled separately or whether only tone control is possible. It also defines whether left and right can be adjusted separately or together.

TONE – 25 dB – + 25 dB	F 03

Tone is controlled for both channels together in effect structures **D-J** and **P-U**.

SELECT ▶

BASS – 25 dB – + 25 dB	F 27
TREBLE – 25 dB – + 25 dB	F 27

In structures **W, Y, Z** bass and treble are controlled separately for both channels

SELECT ▶

L BASS R – 25 dB – + 25 dB I – 25 dB – + 25 dB	F 23
L TREBLE R – 25 dB – + 25 dB I – 25 dB – + 25 dB	F 23

In structures **B, C, X** bass and treble are controlled separately for left and right.

L TREBLE R – 25 dB – + 25 dB I – 25 dB – + 25 dB	F 30

In the structure **V**, treble can be controlled separately for left and right.

SELECT ▶

L ECHO TONE – 25 dB – + 25 dB	F 19
REVERB TONE R – 25 dB – + 25 dB	F 19

In split structures **K-O** tone is controlled separately for each of the two effects.

CLUSTER TYPE —— CLUSTER TIME —— DECAY BALANCE (X)

These three parameters are only contained in the "multitap presets" structure **(X)**. The effect is generated from a total of 22 delays, 2x11 delays (L/R). These delays are programmed with only three parameters for the sake of simplicity (see Section 7, page 57).

CLUSTER TYPE determines the various sequences of individual delays. Selection can be made from 9 cluster types which can be separately determined for left and right.

SELECT ▶

CLUSTER LEFT 01 – 09 Type 1 – 9	F 32
CLUSTER RIGHT 01 – 09 Type 1 – 9	F 32

CLUSTER TIME is the duration of the total cluster. This can be extended up to 900 ms on both sides.

L CLUSTER TIME R 00 – 900 ms I 00 – 900 ms	F 32

DECAY BALANCE produces an alteration in the volume of the individual taps of a selected cluster. Positive values cause the volume of taps to rise as the decay progresses, negative values will result in fading.

Since left and right can be controlled separately, it is possible to achieve panorama effects with appropriate settings (e. g. left + right) (echos move, for example, from left to right).

L DECAY-BAL. R –100% – +100% I –100% – +100%	F 32

VCO DEPTH —— VCO SPEED (C, H, I, M, N)

These two parameters are contained in the structures with VCO echo. With VCO (voltage controlled oscillator) it is possible to modulate the echo with a specific speed (VCO SPEED) and any depth (VCO DEPTH). This can produce floating echo effects. Consequently, flanging (1-10 ms) or chorus (approx. 20-60 ms) can be created using extremely short delay times.

L	VCO DEPTH	R	F 24
00 ms – 50 ms	I	00 ms – 50 ms	
L	VCO SPEED	R	F 24
00 Hz – 10,0 Hz	I	00 Hz – 10,0 Hz	

In the case of VCO echo stereo (C) both channels can be programmed separately. The SPEED is entered in the frequency unit Hertz (Hz = oscillations per second).

(L) *	ECHO VCO DEPTH	F 15
	00 ms – 50 ms	
(L)	ECHO VCO SPEED	F 15
	00 Hz – 10,0 Hz	

In the case of combination structures, entry applies to both channels.

* In the splitting structures, the display will indicate the side of the channel.

> **IMPORTANT:**
> VCO DEPTH greater than twice the delay time can never be selected. Reducing the delay time may reduce VCO-DEPTH.

MODULATION DEPTH —— MODULATION SPEED —— INTENSITY (Y, Z)

These parameters occur in the two effect structures STEREO FLANGER (Y) and STEREO CHORUS (Z). In a similar way to VCO echo, it is possible here to program the modulation depth (DEPTH), modulation speed (SPEED) and, in addition, the intensity (INTENSITY).

MODULATION DEPTH	F 27
00 % – 100 %	
MODULATION SPEED	F 27
00 Hz – 20,0 Hz	
INTENSITY	F 27
– 100 % – + 100 %	

In the case of stereo chorus (Z), **SPEED** is specified in % (00 % – 100 %).

Moving into the negative range means a 180° phase displacement.

EFFECT

This selects the volume of the effect signal, separately for left and right.

L	EFFECT	R	F 01
–79 dB – + 20 dB	I	–79 dB – + 20 dB	

ORIGINAL

This selects the volume of the original signal, separately for left and right.

L	ORIGINAL	R	F 01
–79 dB – + 20 dB	I	–79 dB – + 20 dB	

> **IMPORTANT:**
> – If the original signal is not audible and the display indicates three dashes (---) instead of dB values, the DRP 20 X will have switched to "in loop". Only after switching over to "in series" will the original signal appear at the output in its originally programmed volume. (See "OPTION", Section 11, page 76.)

ORIGINAL and **EFFECT** can be used to allocate to each program any balance between original and effect signal, completely independently of the output control.

9 | COPYING

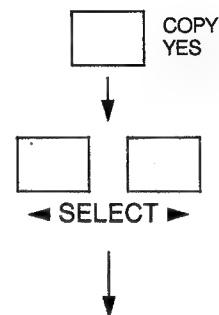The DRP 20 X enables you to copy programs from one memory location to any other. Furthermore, you can file the entire memory contents of a user bank together with the midi patches to tape, compare the data on the tape with the contents of the DRP 20 X and load a complete effect bank from tape to the DRP 20 X.

These four processes are described in detail in this section.

1, Press the copy/yes button ⑲ to go to the copy mode.

2, Press the **select buttons** ⑨ and ⑩ to call up the copy function you desire.

```
            ┌───────┐  COPY
            │       │  YES
            └───────┘
                │
                ▼
     ┌───────┐     ┌───────┐
     │   ·   │     │       │
     └───────┘     └───────┘
        ◄ SELECT ►
                │
                ▼
```

9.1 PROGRAM COPY

3, The display will always first indicate 00 after calling up this function.

```
┌─────────────────────┬────────┐
│ COPY  ⌄00⌃          │  F 01  │
└─────────────────────┴────────┘
```

4, Using the **incrementer** ⑳, enter the program number of the program you wish to copy to another location.
By turning clockwise, you will first consecutively reach the user programs and then the factory programs which are indicated by an "F" in front of the number.

```
        ◄ ● ►
```

5, The display will indicate

```
┌─────────────────────┬────────┐
│ COPY  ⌄F 20⌃        │  F 01  │
└─────────────────────┴────────┘
```

6, Confirm the program you wish to copy by pressing the **enter button** ⑭.

```
            ┌───────┐
            │       │
            └───────┘
             ENTER
```

7, The source program has been entered. The display will flash prompting you to enter the number of the new memory location.

```
┌─────────────────────┬────────┐
│ COPY F 20 TO  ⌄00⌃  │  F 04  │
└─────────────────────┴────────┘
```

8, After you have selected the memory location using the **incrementer** ⑳ and pressed the **enter button** ⑭ to confirm, the DRP 20 X will ask whether you are sure. This is done because the program resident at this location will, after completion of this process, be replaced by the new one and thus deleted.

```
┌─────────────────────┬────────┐
│ COPY F 20 TO 110    │  F 01  │
│ ARE YOU SURE?       │        │
└─────────────────────┴────────┘
```

9, Storage will take place when you press the **copy/yes button** ⑲ . The copy process can be aborted by pressing the **enter button** ⑭ ...

```
        ┌───────┐  COPY              ┌───────┐
        │       │  YES               │       │
        └───────┘                    └───────┘
            │                         ENTER
            ▼
┌─────────────────────┬────────┐
│ COPY F 20 TO 110    │  F 01  │
│ READY               │        │
└─────────────────────┴────────┘
```

10, The display will briefly (approx. 1s) indicate "READY" (e. g. storage process has been completed).

```
┌─────────────────────┬────────┐
│ CATHEDRAL           │  F 01  │
└─────────────────────┴────────┘
```

11, The DRP 20 X will then return to the normal program selection mode.
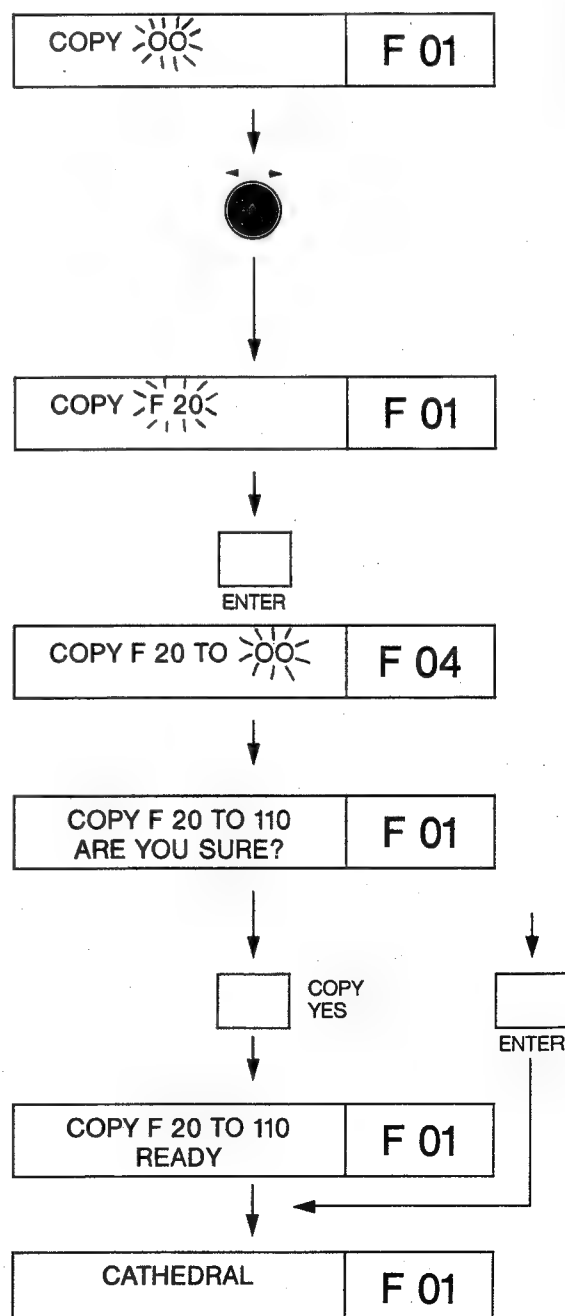
9.2 FROM DRP 20 X TO TAPE

Connect the OUT jack of the tape jacks ㉘ on the DRP 20 X with the line-in jack (L or R) of a recorder.

For this purpose, use a normal RCA cable.

3, After selecting this copy function, the display will indicate

4, Switch the recorder to record and start the copying process by pressing the **enter button** ⑭ .
Make sure that the recording modulation on your recorder is between -6 dB and max. 0 dB.

> If the level is higher or lower, adjust it to the correct value and simply abort the process by pressing the enter button. Now start from the beginning at point 1, page 71.

5, The DRP 20 X will now transfer data to the tape. The program number display will count the numbers from 00 to 133.
00 – 127 : Programs of the user bank
128 – 133 : All midi data and midi patches
The entire user bank and all midi patches will have been stored to tape after approx. 2.5 minutes.

6, The DRP 20 X will then return to the normal program selection mode.

9.3 VERIFY TAPE

This function provides you with the possibility of comparing data recorded to tape with those resident in the DRP 20 X. In this way, you can identify any errors which may have occurred during the recording process (e. g. creases on the tape).

Now connect the line-out jack on your recorder to the IN jack of the tape jacks (28) on the DRP 20 X. Make sure that you use the same channel side (L or R) as for the recording.

3, After selecting this copy function, the display will indicate

4, Press the enter button ⑭ and then immediately start your recorder at a point shortly before the recorded data.

| DRP 20 X | OUT IN |
| TAPE |

| LINE IN | e. g. Tape recorder |

| SAVE TO TAPE | F 01 |

ENTER

| SAVE TO TAPE | at 00 ····· to 133 |

| CATHEDRAL | F 01 |

| DRP 20 X | OUT IN |
| TAPE |

| LINE OUT | e. g. Tape recorder |

| VERIFYING TAPE | F 01 |
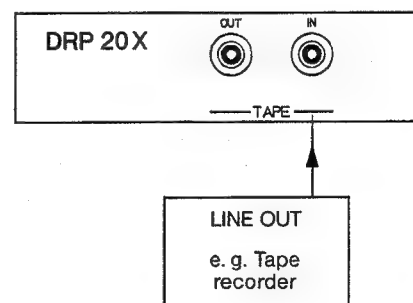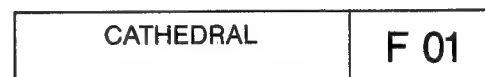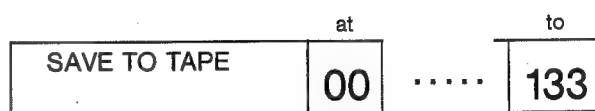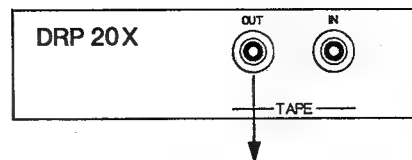
ENTER

The DRP 20 X waits approx. 10 seconds. If no signal (or faulty signal) is received within this period, the display will indicate "NO VALID TAPE SIGNAL". If this is the case, press the enter button once again to return to the program mode. Now, first check the connection, your tape material, and whether the tape has been started at the correct point (shortly before data start). Now start again at point 1, page 71.

5, The DRP 20 X will now compare its internal data with data on tape for agreement and will again count from 00-133.

| VERIFYING TAPE | at 00 | ····· | to 133 |

6, The comparison will be completed after approx. 2.5 minutes and the display will indicate

| VERIF. 00 TO 133 | F 01 |

7, After approx. 10 seconds, the DRP 20 X will automatically switch back to the program selection mode. You can, however, do this immediately by pressing the enter button.

| CATHEDRAL | F 01 |
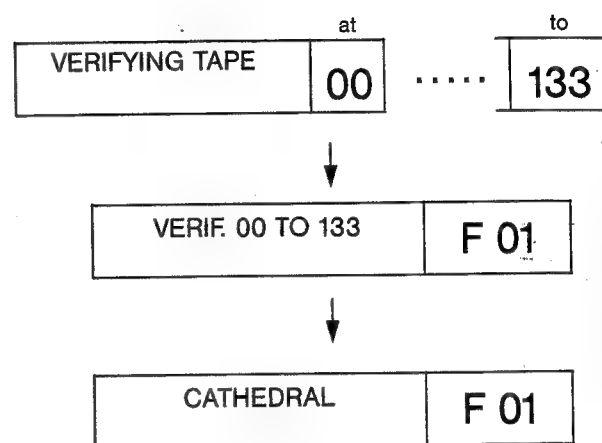
9.4 FROM TAPE TO THE DRP 20 X

This fourth copy function enables you to load (and thus store) a complete new user bank to the DRP 20 X. However, before doing so, do not forget to file the resident user bank to a tape (see 9.2, page 72), because the resident user bank will be deleted by loading the new one.
Connect your recorder to the DRP 20 X as described above in 9.3.

3, After selecting this copy function, the display will indicate

| LOAD FROM TAPE | F 01 |

4, Press the **enter button** ⑭ and then immediately start your recorder shortly before the recorded data. (See box, page 73 below.)

| |
| ENTER |

5, The DRP 20 X will now receive the data from tape and again counts synchronously from 00-133.

| LOAD FROM TAPE | at 00 | ····· | to 133 |

6, The complete bank will have been stored after approx. 2.5 minutes and the display will indicate the initial and final number of the program numbers stored.

| LOAD 00 TO 133 | F 01 |

7, After approx. 10 seconds, the DRP 20 X will automatically return to the program selection mode. However, this can also be done immediately by pressing the enter button.
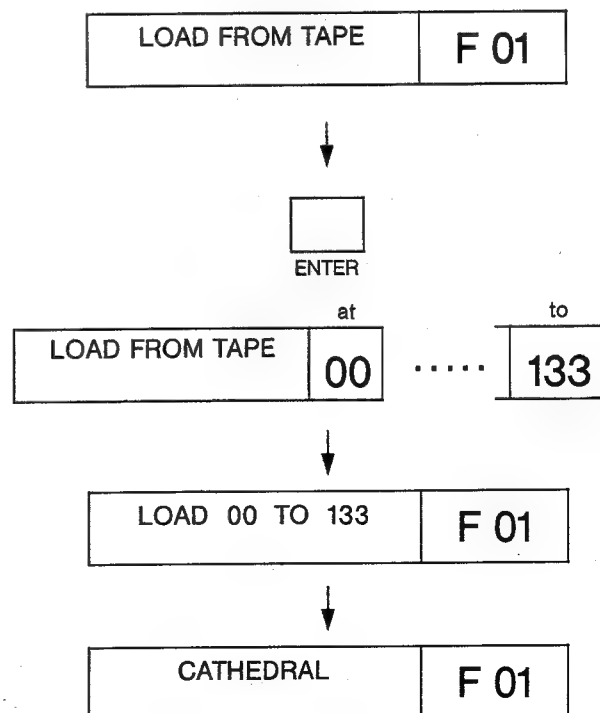
| CATHEDRAL | F 01 |

(Please observe the three important notes on the next page.)

IMPORTANT:

- If you switch the recorder off while data are being transferred, thus interrupting the loading of a complete bank, only those programs will be stored which were transferred up to the point at which the process was aborted – the remaining old programs in the DRP 20 X will remain unchanged.

  Example: You switch off after program 26.
  The display will then indicate under point 6,

LOAD 00 TO 26	F 01

- The situation is similar when you switch on the recorder in the middle of data information on tape. The programs will be stored as of the point at which the tape was started – all other old programs will remain unchanged.

  Example: You start the recorder as of program 37.
  After completion of the loading process as described in point 6, the display will indicate

LOAD 37 TO 133	F 01

- Should any taped data be lost after prolonged periods of storage, e. g. the data of one or several programs are defective, the DRP 20 X will still continue to load in the normal way. The defective programs will be automatically ignored and the preceding programs will be retained at their original locations.

  Example: Programs 2, 19, 87 and 123 are defective on the tape.
  After completion of the loading process as described in point 6, the display will indicate

LOAD 00 TO 133 NOT LOADED 02, 19, 87, 123	F 04

- After faulty tape operations (display shows: VERIFY ERROR, NOT LOADED OR LOAD ERROR), the DRP 20 X will not return to the program selection mode automatically, but only after pressing the enter button.

10 | REMOTE CONTROL

The DRP 20 X provides you with the possibility of remotely controlling three important functions by foot switch. The remote jacks (26) are located at the rear of the housing.
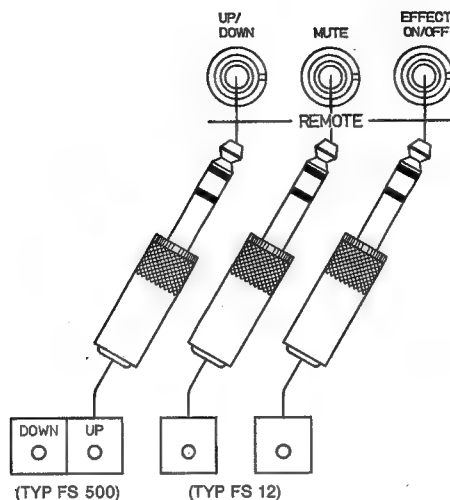
UP/DOWN	–	By connecting a double foot switch FS 500 to this jack, the user programs can be stepped through forwards or backwards. The selected program will be loaded automatically.
MUTE	–	By connecting a foot switch FS 12 to this jack, the mute function (Section 5.6, page 54) can be activated. The status is indicated by the mute LED.
EFFECT ON/OFF	–	By connecting a foot switch FS 12 to this jack, the effect off function (Section 5.5, page 54) can be activated. The status is indicated by the effect off LED.

11 | OPTION

The option programs include a series of important additional functions and presets.

e. g. The way in which your DRP 20 X is to respond after switching on or whether you wish the parameters to be indicated in dB or in a relative value 0-100, whether the delay time is displayed in ms or in bpm... and much more. You are provided with a total of 19 options. These options, and how to use them, are described in detail in this section.

1, In order to activate the option programs, simultaneously press the factory program button ⑪ and the user program button ⑫ for approx. 3 seconds.

2, The display will indicate the first option program.

3, Use either the incrementer ⑳ or the select buttons ⑨ and ⑩ to locate the option you require.
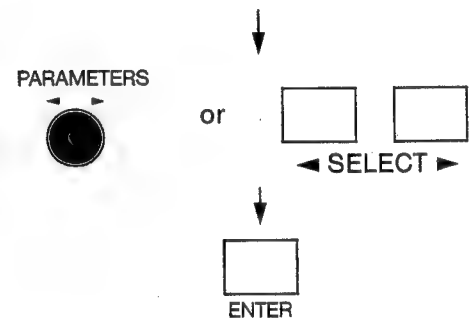
4, Press the enter button ⑭ to start or/and abort an option program.

```
        ┌─ OPTION ─┐
        ┌───┐   ┌───┐
        │   │   │   │
        └───┘   └───┘
      FACTORY   USER
           │
           ↓
  ┌────────────────┬──────┐
  │ OPTIONAL FUNCT.│      │
  │ EXIT (NO CHANGE)│ F 01 │
  └────────────────┴──────┘
           │
           ↓
 PARAMETERS
   ◄───►              ┌───┐ ┌───┐
    ●          or     │   │ │   │
                      └───┘ └───┘
                      ◄ SELECT ►
                          │
                          ↓
                      ┌───┐
                      │   │
                      └───┘
                      ENTER
```
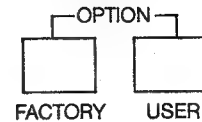
1) ┌────────────────┬──────┐
   │ OPTIONAL FUNCT.│   │
   │ EXIT (NO CHANGE)│ F 01 │
   └────────────────┴──────┘

Quitting the option menu and returning to the normal program selection mode.

2) ┌────────────────┬──────┐
   │ OPTIONAL FUNCT.│   │
   │   RESET   │ F 01 │
   └────────────────┴──────┘

Software reset of the DRP 20 X processors.

3) ┌────────────────┬──────┐
   │ OPTIONAL FUNCT.│   │
   │ SOFTWARE-VERSION│ F 01 │
   └────────────────┴──────┘

Indication of the software version number for the built-in frontend and host processors on the display.

4) ┌────────────────┬──────┐
   │ OPTIONAL FUNCT.│   │
   │ DISPLAY-TEST   │ F 01 │
   └────────────────┴──────┘

All illuminated segments of the two displays and the LEDs are lit up to check the function of all individual segments.

5) ┌────────────────┬──────┐
   │ OPTIONAL FUNCT.│   │
   │ WHITE NOISE   │ F 01 │
   └────────────────┴──────┘

The DRP 20 X functions as a noise generator. White noise is present at both outputs up to the point of abort.

6) ┌────────────────┬──────┐
   │ OPTIONAL FUNCT.│   │
   │ PINK NOISE   │ F 01 │
   └────────────────┴──────┘

Pink noise is present at the outputs up to the point of abort. It has the prime purpose of calibrating and adjusting PA systems.

7)

OPTIONAL FUNCT. MIDI-IN MONITOR	F 01

All incoming midi signals are indicated as hex codes in moving-word display form. The midi real time command "active sensing" (=midi byte) is signalized on the program number display as a briefly illuminated "FE".

Pressing the midi button will switch over to the dump function. This provides the capability of slowly paging through the current contents of the midi memory using either the incrementer or the select buttons. All bytes indicated will be counted in ascending or descending order under the flashing mark. The counter is reset to "0" by pressing the user button.

8)

OPTIONAL FUNCT. DRP 20 IN LOOP	F 01

Used for looping the DRP 20 X into a mixing console. In all programs, the original signal (parameter "original") is deactivated and appears on the display as "---dB". However, the stored values will be retained (except for parameter structure A).

9)

OPTIONAL FUNCT. DRP 20 IN SERIES	F 01

The original signal is switched in and appears at the output with the volume at which it was stored.

10)

OPTIONAL FUNCT. DRP 20 IN MONOSER	F 01

The original left signal is switched in as stored, the original right signal cut off.

11)

OPTIONAL FUNCT. POWER-ON TO F 01	F 01

After switching on and resetting, the DRP 20 X will always go to program F01.

12)

OPTIONAL FUNCT. POWER-ON TO MEMO	F 01

The DRP 20 X goes to the program last used, or to the status in which it was switched off (except copy, store, option).

13)

OPTIONAL FUNCT. PARAMETER IN dB	F 01

The DRP 20 X indicates all level values in dB (e. g. DECAY, TONE...).

14)

OPTIONAL FUNCT. PARAMETER INORMAL	F 01

The DRP 20 X indicates all level values as a relative numerical value (e. g. 0-100).

15)

OPTIONAL FUNCT. ECHO-TIME IN MS	F 01

The DRP 20 X indicates the echo delay time in ms (milliseconds).

16)

OPTIONAL FUNCT. ECHO-TIME IN BPM	F 01

The DRP 20 X indicates the echo delay time in BPM (beats per minute). This has the purpose of synchronizing the echo time with the beat or speed of a piece of music.

17)	OPTIONAL FUNCT. DELETE MIDI PATCH	F 01

This enables midi patch assignments to be deleted from user programs to create space in the midi patch memory.

The display first indicates the actual contents of the midi patch memory. The display then indicates "END DELETING". At this point, the option program can either be exited or switched to one of the "DELETE PATCH xx" lines using the incrementer. The display will only indicate those user program numbers featuring midi patches. After pressing the **enter button** ⑭ , the bottom line will indicate "ARE YOU SURE" which can be confirmed by pressing one of the two "YES" buttons. The next program number will now be automatically offered for deletion. You can abort after selecting the "END DELETING" line.

18)	OPTIONAL FUNCT. VIEW MIDI PATCHES	F 01

Indicates the number of occupied and free midi patches of all user programs.

19)	OPTIONAL FUNCT. RESET MIDI-EDIT	F 01

Deletes all parameter edits in the selected program which were brought about by midi controls. Within the DRP 20 X, therefore, all midi controls are set to "0" which can be very useful, for example, in the case of an interrupted midi network. Normal edits will, of course, be retained.

12 | MIDI

Midi is connected at the **midi jacks in/thru** ㉗ .

The midi functions in the DRP 20 X permit external control of the unit. Owing to the versatile and flexible possibilities, all functions can be controlled from another device with midi capability (e. g. computer, sequencer, keyboard...). E. g.:

- Switching over programs
- Altering specific parameters
- Switching the effect signal on and off

...and much more.

There are two different midi menus:

1. The **MIDI MAIN MENU** (see 12.2) for selecting all general midi data
2. The **MIDI PATCH MENU** (see 12.3) which, in the edit mode parameter, permits midi patches to be allocated to any program – e. g. the parameters to be governed by midi controllers (midi standard).

> If you do not possess any experience in dealing with MIDI, we recommend that you first gather general information on midi standards and interfaces (e. g. midi book, computer or music magazines).
>
> You will also find a brief, general explanation on page 82, in the box below.

12.1 GENERAL OPERATION

1, Press the midi button ⑯ to go to the midi menu you require,
   – to the midi main menu from the normal program mode.
   – to the midi patch menu from the parameter edit mode only.

2, Top line: midi function (heading)
   Bottom line: parameter line

3, The individual midi functions within a menu, as well as several parameters within a parameter line, are stepped through by means of the two select buttons ⑨ and ⑩ .

4, Use the incrementer ⑳ to page through the parameter lines within a midi function.
   This is also used for setting parameters.
   All settings are activated immediately.

MIDI

z. B.

MIDI - CONTROL
POLY CH 01   F 01

◄ SELECT ►

PARAMETERS

ENTER

5, Exit the MIDI menu by pressing the **enter button** ⑭ .

Example:

PARAMETERS

MIDI-CONTROL OFF	F 01		
MIDI-CONTROL OMNI	F 01		
MIDI-CONTROL POLY CH 01	F 01	MIDI-CONTROL POLY CH 01–16	F 01

◄ SELECT ►

PARAMETERS
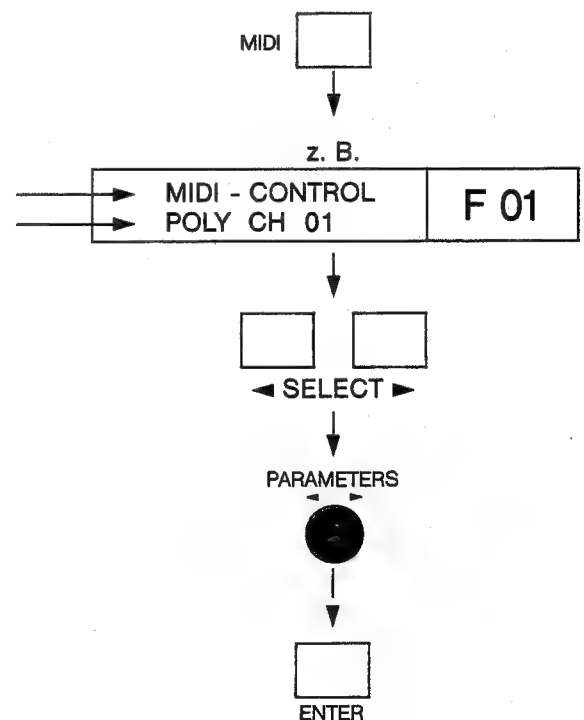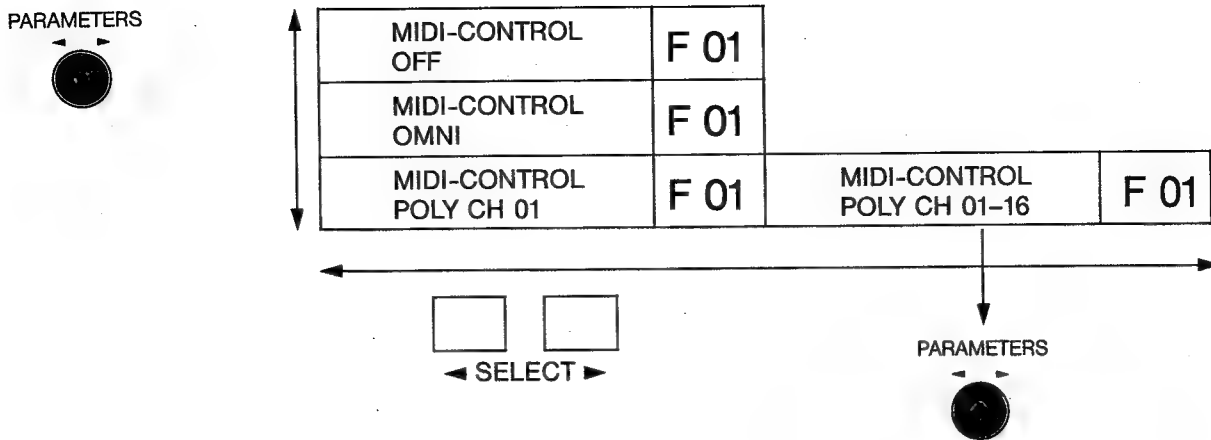
12.2 MIDI MAIN MENU

This menu offers four midi functions

MIDI CONTROL

OFF — The DRP 20 X does not react to midi receive data.

OMNI — The DRP 20 X reacts to midi receive data on all 16 midi channels.

POLY — The DRP 20 X reacts to midi receive data on only one midi channel between 1 and 16.
In this function, it is possible to select between midi channels 1 to 16.

MIDI TO DRP 20 X CONV.

This midi function enables you to draw up 5 different allocation tables of your choice. In each of the 5 tables you can allocate any combination of the 128 DRP programs to the 128 general midi program numbers.

PARAMETERS

from

| MIDI TO DRP CONV. 00 = F 00 TAB. 1 | F 01 |

127   127   5

MIDI-Programm numbers   Tables numbers

DRP-Program numbers

PROGRAM CHANGE OFF

to   PROGRAM CHANGE FIX
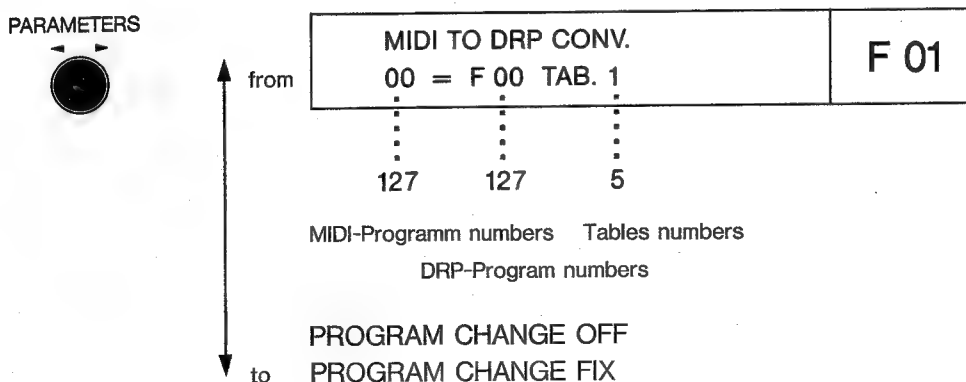
Example of a table:

TAB. 4: 00 = F18   (Factory program)
         01 = 105   (User program)
         02 = 30
         03 = 30   (Several midi program numbers can be 04 = 30
         05 = F99   given identical DRP program numbers)
         06 = F01   (Order and sequence of the programs
         07 = 05   can be freely determined)
         98 = --   (MIDI Programnumber will be ignored)
         128 = F88

PROGRAM CHANGE OFF   — The DRP 20 X ignores midi program change data.
PROGRAM CHANGE FIX   — The user programs 00-127 are activated by the midi program numbers on a 1:1 basis
                           without having to alter any table.

MUTE TRIGGER AND EFFECT OFF TRIG.

This enables you to activate the two functions MUTE and EFFECT OFF by midi. 72 parameter lines are provided for you to freely determine whether these functions are activated from a keyboard button (note), from midi switch or from a midi controller.

MUTE-TRIGGER oder EFFECT-OFF-TRIG.			
CONTR. 00		T < 99% .... > 99%	**F 01**

PARAMETERS

„CONTR. 01"	(Modul.-Wheel)	T. < 99% .... > 99%	
„CONTR. 02"	(Breath-Contr.)	T. < 99% .... > 99%	
„CONTR. 03"		T. < 99% .... > 99%	
„CONTR. 04"	(Foot-Contr.)	T. < 99% .... > 99%	
„CONTR. 05"	(Port.Time)	T. < 99% .... > 99%	
„CONTR. 06"	(Data-Entry)	T. < 99% .... > 99%	
„CONTR. 07"	(Volume)	T. < 99% .... > 99%	**A,**
dto.		dto.	
„CONTR. 31"		T. < 99% .... > 99%	
„PITCH-WHL"	(Pitch-Wheel)	T. < 99% .... > 99%	
„CH.PRESS."	(Channel)	T. < 99% .... > 99%	
„AFT. TOUCH"	(polyphon)	T. < 99% .... > 99%	
„VELOCITY"		T. < 99% .... > 99%	
„RELEASE"		T. < 99% .... > 99%	
„NOTE ON"		N. -c2 .... g 8	**B,**
„NOTE OFF"		N. -c2 .... g 8	
„SWITCH 64"	(Sustain-Switch)	on, off, on/off	
„SWITCH 65"	(Port.-Switch)	on, off, on/off	
„SWITCH 66"	(Sustain-Pedal)	on, off, on/off	**C,**
„SWITCH 67"	(Soft-Pedal)	on, off, on/off	
dto.		dto.	
„SWITCH 95"		on, off, on/off	
„NO MIDI-CONTROL"			**→D,**

A) In the case of midi controllers "00" to "31" and up to "release", a switching threshold can be entered in % under "T" (threshold) on the right-hand side of the parameter line. This percentage value refers to the entire control range of the respective midi controller.
   - If T is less than (<)%, the MUTE (or EFFECT OFF) function will change if the value selected is not met.
   - If T is greater than (>)%, the MUTE (or EFFECT OFF) function will change if the value selected is exceeded.
   The switching status is naturally signalized by the relevant LEDs.

B) In the case of midi note values "note on" and "note off", MUTE (or EFFECT OFF) can be controlled from a freely determinable keyboard key. A key between -c2 and g8 can be defined under "N" (note) in American format. A note-on event with velocity = 0 will be identified in the DRP 20 X as note off (midi standard).

C) In the case of midi switches "64" to "95", the switching status can be defined on the right-hand side of the parameter line:

ON The MUTE (or EFFECT OFF) function will change as the MIDI switch is activated (e. g. pressing the sustain pedal).

OFF The MUTE (or EFFECT OFF) function will change as the MIDI switch is deactivated (e. g. releasing the sustain pedal).

ON/OFF The MUTE (or EFFECT OFF) function will change with each MIDI switch movement (e. g. pressing as well as releasing the sustain pedal).

D) Selection of the parameter line "no midi control" will result in no patch assignment.

> The midi controller, midi switches and midi note numbers are defined as general midi standards. As in computer technology, each midi event is assigned a specific address (byte sequence) which is recognized in the same way by each activated midi interface. Consequently, midi generally represents a language used for communication at one level between equipment from different manufacturers.

12.3 MIDI PATCH MENU

In contrast to the midi main menu, this menu is called up in the parameter edit mode. Here, you have the possibility of altering effect parameters in real time using any other device with midi capability.

E. g.: Altering the reverberation time (decay) at the modulation wheel ("CONTR. 01") on a keyboard.

This example would be a patch. The DRP 20 X is capable of storing a maximum of 60 midi patches. This means that 60 parameters can be controlled by midi events.

The 60 midi patches can, of course, be distributed in any way and stored to the user programs.

The parameters of the midi patch menu within a program correspond to the parameter list of the effect structure used here. The individual effect parameters (e. g. tone, decay, room size, HI damp, etc.) will appear in the top line of the display and are activated using the select buttons. The required midi allocation is determined in the bottom line using the incrementer. As in the case of mute and effect off trigger (see page 53), you can also choose from all the possibilities (72 lines) defined in the midi standard:

z. B.

```
+-------------------------------------------------+---------+
|                    DECAY                         |         |
|                                                  |  F 01   |
|   CONTR. 00              R. –100% .... + 100%     |         |
+-------------------------------------------------+---------+
```

PARAMETERS

„CONTR. 01"	(Modul.-Wheel)	R. –100 % .... + 100 %
„CONTR. 02"	(Breath-Contr.)	R. –100 % .... + 100 %
„CONTR. 03"		R. –100 % .... + 100 %
„CONTR. 04"	(Foot-Contr.)	R. –100 % .... + 100 %
„CONTR. 05"	(Port.-Time)	R. –100 % .... + 100 %
„CONTR. 06"	(Data-Entry)	R. –100 % .... + 100 %
„CONTR. 07"	(Volume)	R. –100 % .... + 100 %
dto.		dto.
„CONTR. 31"		R. –100 % .... + 100 %
„PITCH-WHL"	(Pitch-Wheel)	R. –100 % .... + 100 %
„CH.PRESS."	(Channel)	R. –100 % .... + 100 %
„AFT. TOUCH"	(polyphon)	R. –100 % .... + 100 %
„VELOCITY"		R. –100 % .... + 100 %
„RELEASE"		R. –100 % .... + 100 %
„NOTE ON"		R. –100 % .... + 100 %
„NOTE OFF		R. –100 % .... + 100 %
„SWITCH 64"	(Sustain-Switch)	R. –100 % .... + 100 %
„SWITCH 65"	(Port.-Switch)	R. –100 % .... + 100 %
„SWITCH 66"	(Sustain-Pedal)	R. –100 % .... + 100 %
„SWITCH 67"	(Soft-Pedal)	R. –100 % .... + 100 %
dto.		dto.
„SWITCH 95"		R. –100 % .... + 100 %
„NO MIDI-CONTROL"		

Entry is made in %, the preceding letter "R" stands for range. The parameter is lowered in the negative range and raised in the positive range. The value indicates the total range of the selected midi control, where 100 % always corresponds to the total range of the respective parameter.

An example:

If the original left parameter is set to -40 dB and if the midi controller 01 (mod.wheel) is programmed from +50%, the original left signal can be changed from -40 dB to + 10 dB on the modulation wheel of a keyboard.

All MIDI controller or range changes are activated immediately (real time).

Any midi patches selected can then be stored in the program. This process is described in Section 5.4, page 52.

The gate in programs featuring gate (reverb & gate) can be triggered via midi. Here, the midi patch menu also contains the GATE-TRIGGER parameter. In the automatic freeze structure it is called FREEZE-TRIGGER and, in manual freeze, INPUT-TRIGGER. As in the case of mute and effect off, the trigger level can be defined here as a threshold value. The gate status (GATE ON/OFF) is also displayed for midi triggering.

IMPORTANT:

– Make sure that "midi control" is not switched "OFF" in the midi main menu (Section 12.2, page 80), since midi data will be ignored in this case.

To facilitate understanding, follow each step of the example on the next page.

10 examples with programmed midi patches are filed to the factory programs 88-99.

Example: You wish to program two patches in user program 27. The reverberation time is to be shortened upon turning the modulation wheel on your keyboard and the predelay lengthened upon pressing the sustain pedal:

Call up user program 27.

Go to the edit parameter mode ..

and choose the desired parameter (decay) using select.

Press the midi button to go to the midi patch menu.

Select the desired midi controller (contr.01) using the incrementer.

Move to the right using select...

and adjust the range to approx. -15%.

Use select to move to the next parameter (predelay)...

and select the midi controller (switch 66) desired for this parameter.

Move to the right using select...

to set the value to +50%.

Press the store/yes button to start the storage process....

and confirm the flashing program number by pressing **enter** ⑭.

Store the two patches after answering the question "ARE YOU SURE" by pressing **store/yes 0**.

You will then be returned to the normal program selection mode.

Display	Prog
RAILWAY	27
z.B. TONE − 13 dB	27
DECAY − 80 dB	27
DECAY NO MIDI CONTROL	27
DECAY CONTR. 01 R. 00 %	27
DECAY CONTR. 01 R. 00 %	27
DECAY CONTR. 01 R. -15 %	27
PRE DELAY NO MIDI CONTROL	27
PRE DELAY SWITCH 66 R. 00 %	27
PRE DELAY SWITCH 66 R. 00 %	27
PRE DELAY SWITCH 66 R. +50 %	27
STORE PRG TO 27	27
STORE PRG TO 27 ARE YOU SURE?	27
RAILWAY	27

EDIT-PARAM.
SELECT ►
MIDI
SELECT ►
SELECT ►
SELECT ►
STORE YES
ENTER
STORE YES
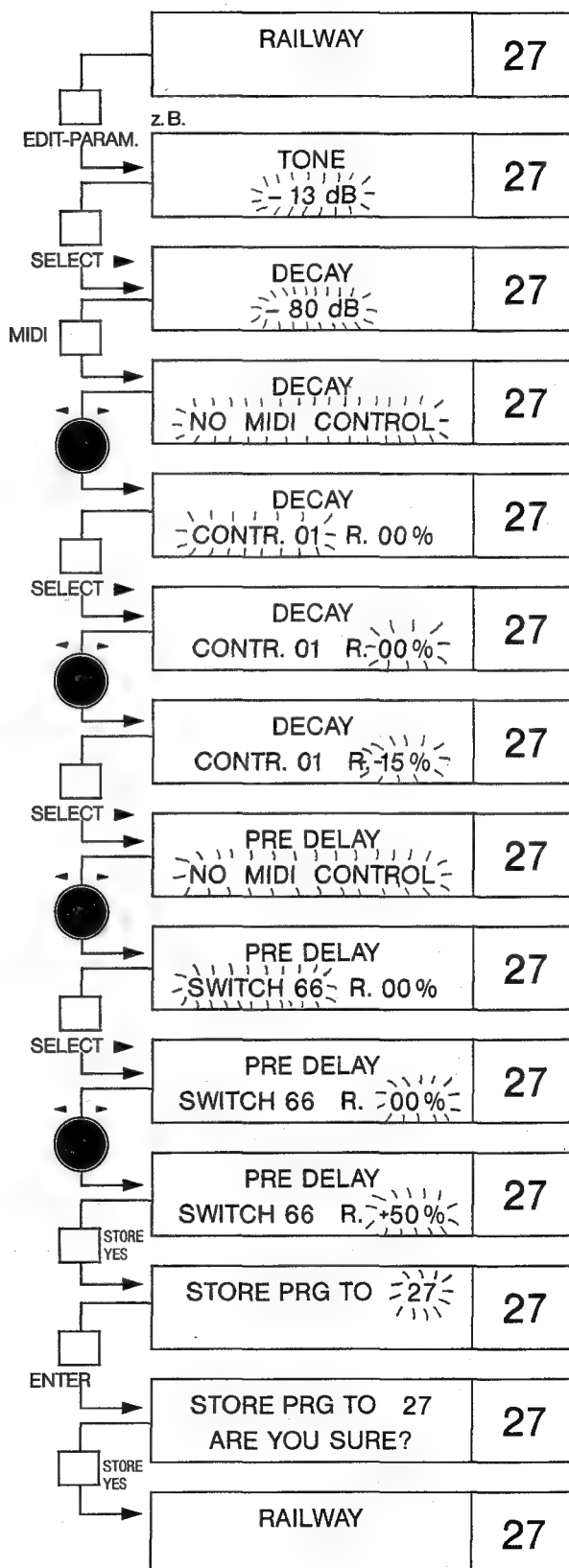
13 | SPECIFICATIONS

Input level	3 mV – 3 V
Input impedance	unbalanced 10kOhm balanced 20kOhm
Tone control	digital acc. to effekt
Effect	Multiprocessor
Midi	IN / THRU
Output/original	1,55 V
Output/Effect	1,55 V
Frequency response/Effect	20 Hz – 15 kHz
Signal to noise (A,RMS)	> 90 dB
Distortion	< 0,1 %
Dimensions (W x H x D)	483 x 96 x 283 mm
Weight	ca. 5,0 kg (12,1 lbs)
Power consumption	20 VA
Accessories	FS 500 / FS 12

– Subject to alteration –

DRP 20 X QUICK GUIDE

PROGRAMMWAHL

ENTER SELECT ▲ ▼ ODER

MIDI-HAUPT

MIDI SELECT ▲ ▼ (wählen) (stellen)

SPEICHERN
(STORE)

STORE YES (speicherplatzwahl) ENTER (abspeichern) (abbrechen) STORE YES

BETITELN
(EDIT-TITLE)

TITLE SELECT ▲ ▼ (CURSOR) (zeichenwahl) (speichern ??)

EDITIEREN
(EDIT-PARAMETER)

EDIT PARAM. SELECT ▲ ▼ (CURSOR) (stellen)

MIDI-PATCH

MIDI SELECT ▲ ▼ (CURSOR) (stellen)
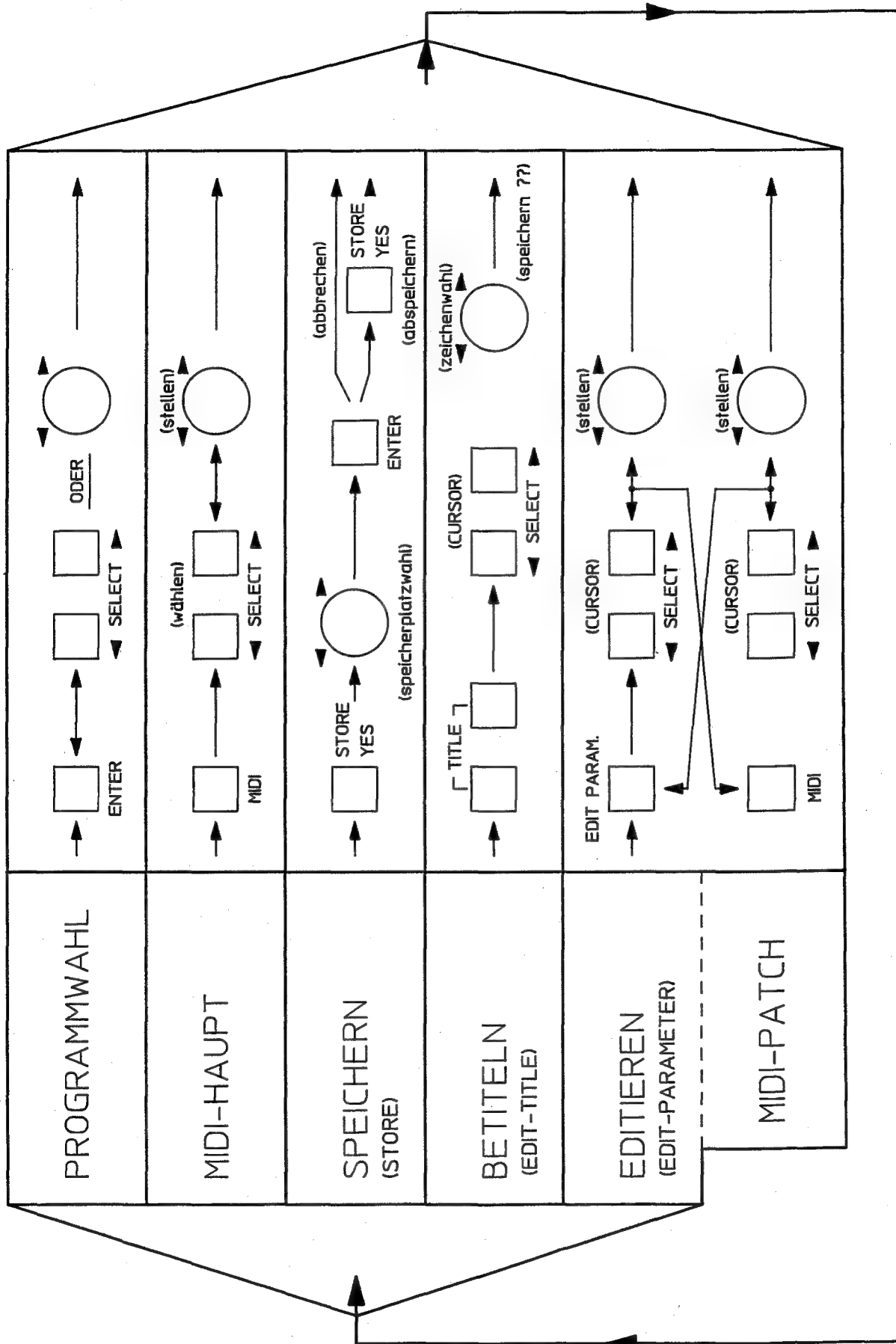
MENÜS: COPY, EFFECT-EDIT UND OPTION SIEHE ANLEITUNG

PARAMETER

MEMORY NO.	PROGRAM	MODE NO.	ORIGINAL (dB)	EFFECT (dB)	TONE (dB)	BASS (dB)	TREBLE (dB)	DELAY RATIO	REVERB DELAY TIME (ms)	PROPORTION	ROOM SIZE (cbm)	DECAY (dB)	RELEASE (dB)	DAMP LO HI	GATE TIME (ms)	REFL. VOLUME (dB)	REFL. CLUSTER	PRE DELAY (ms)	REFL. REV.DELAY (ms)	ECHO RETURN (dB)	ECHO DELAY TIME (ms)	ECHO FEEDBACK %	FEEDBACK %	CLUSTER	CLUSTER TIME (ms)	DECAY BAL.	THRESHOLD %	ECHO VCO DEPTH (ms)	ECHO VCO SPEED (Hz)	REVERB RETURN (dB)	REVERB TONE (dB)	REVERB PROPORTION	REVERB ROOM SIZE (cbm)	REVERB DECAY (dB)	INTENSITY (%)	REV. PRE.DELAY (ms)	ECHO TONE (dB)	DELAY TIME (ms)	HF DAMP	VCO DEPTH (ms)	VCO SPEED (Hz)	MODULATION DEPTH SPEED (%) (Hz)	REMARKS

PARAMETER

MEMORY NO.	PROGRAM	MODE NO.	ORIGINAL (dB)			EFFECT (dB)			TONE (dB)		BASS (dB)			TREBLE (dB)			DELAY RATIO	REVERB DELAY TIME (ms)	PROPORTION	ROOM SIZE (cbm)	DECAY (dB)	RELEASE (dB)	DAMP LO HI	GATE TIME (ms)	REFL. VOLUME (dB)	REFL. CLUSTER	PRE DELAY (ms)	REFL. REV.DELAY (ms)	ECHO RETURN (dB)	ECHO DELAY TIME (ms)	ECHO FEEDBACK %	FEEDBACK % %	CLUSTER	CLUSTER TIME (ms)	DECAY BAL.	THRESHOLD %	ECHO VCO DEPTH (ms)	ECHO VCO SPEED (Hz)	REVERB RETURN (dB)	REVERB TONE (dB)	REVERB PROPORTION	REVERB ROOM SIZE (cbm)	REVERB DECAY (dB)	INTENSITY (%)	REV. PRE.DELAY (ms)	ECHO TONE (dB)	DELAY TIME (ms)	HF DAMP	VCO DEPTH	VCO SPEED (Hz)	MODULATION DEPTH SPEED	MODULATION (%) (Hz)	REMARKS
			L	L+R	R	L	L+R	R	L	L+R R	L	L+R	R	L	L+R	R		R		(cbm)	(dB)	(dB)	R	(ms)	R	R	(ms)	R	L	L	L	L L+R R	L R	L L+R R	L+R R ON OFF			R	R	R	R	R		R L	L	L R	L+R R	L L+R R	L+R R	(%) (Hz)	

Blockdiagram

WARTUNG UND SERVICE

DYNACORD Geräte sind Qualitäts-erzeugnisse. Umfangreiche Waren-eingangskontrollen sorgen für eine einwandfreie Qualität der einzelnen Bauteile.

Die Geräte werden, bevor sie das Werk verlassen, einem Dauertest über mehrere Stunden unterzogen. Auf unsere Erzeugnisse gewähren wir im Rahmen unserer allgemeinen Bedingungen eine Garantie von 24 Monaten. Die Garantieleistung er-lischt im Falle eines Fremdeingriffs oder bei einem Defekt, der auf Falsch-anwendung zurückzuführen ist.

Im Servicefall wenden Sie sich bitte an Ihren Fachhändler oder an die nächste Servicewerkstätte.

SERVICE AND MAINTENANCE

DYNACORD products are highquali-ty products. Extensive and strict in-spections on all components received ensure perfect and consistent quality of all parts and final product.

Prior to leaving our factory, the units are subjected to an endurance test for serveral hours. Within the scope of our general conditions of sale we are gu-aranteing a warranty of 24 months on our products. This warranty does not apply to defects or damages caused by unhauthorized repair or to dema-ges due to misuse.

If the unit becomes defective, please apply to the nearest qualified service shop or to your dealer or importer.

SERVICE ET PRECAUTION

Les appareils DYNACORD, sont des produits de haute qualité. De nom-breux contrôles de la marchandise ga-rantissent une qualité irréprochable de chaque élément de construction.

Avant de quitter l'usine, sont les ap-pareils soumis à un test d'endurance de plusieurs heures. Nous accordons sur nos produits une garantie de 24 mois dans le cadre de nos conditions générales. Cette garantie n'est pas valable en cas d'intervention étrangè-re ou den cas de défaut résultant d'une mauvaise utilisation.

Pour le service après-vente, veuillez vous adresser à l'atelier du service aprés-vente le plus proche.